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Bibliography on Ionospheric Propagation, p. 489

. 6 April 1955 No. 4

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 6 APRIL, 1955 No. 4

SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Ionospheric Propagation

by
Mary L. Rice

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references on a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Bibliographies published this year are:

1. **Bibliography of Bibliographies on Meteorology,** Vol. 6, No. 1, Jan. 1955
2. **Textbooks and Monographs Containing Subject Bibliographies,** Vol. 6, No. 2, Feb. 1955
3. **Storm Surges,** Vol. 6, No. 3, March 1955
4. **Ionospheric Propagation,** Vol. 6, No. 4, April 1955

Forthcoming bibliographies will be:

5. **Photochemistry of Upper Atmosphere,** Vol 6, No. 5, May 1955
6. **Cloud Physics,** Vol. 6, No. 6, June 1955

Other bibliographies in preparation are:

Actinometers	*Night Airglow*
Arctic Synoptic Meteorology	*Ocean-Atmosphere Energy Exchange*
Climate of the Arctic	*Ozone*
Cosmic Rays in the Atmosphere	*Singularities*
Fog Forecasting	*Snow Cover*
Indoor Climatology	*Synoptic Aerology*
Microwave Propagation	*Tropical Cyclones*

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue cumulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

TEXTBOOKS, MONOGRAPHS AND OTHER IMPORTANT WORKS

6.4–1 551.582(02)

*†Kendrew, Wilfrid George, **The climates of the continents.** 4th ed. Oxford, Clarendon ress, **1953.** 607 p. 194 figs. (incl. charts & graphs), numerous tables, bibliog. p. 579–584. **WB**—"The book has been enlarged and entirely reset for this edition. Many sections have een rewritten to bring the treatment up to date. Nearly all the climatic means have been evised, and data for many new stations added, useful material having become available in ecent years as a result of demands of air-navigation in peace and war. Several new tables re included of wind-directions, diurnal temperatures, sunshine, fog, and other elements to rovide a broader foundations for the detail which the practical worker on any area requires." rom preface). Since the first edition in 1922 this work has been the standard source of nformation about the climate of any region in the world for the English speaking student. hough giving extensive tables of data for countless locations, the scope of the work naturally recludes much frequency or other analytical data (except for wind direction, cloud height nd amount, and visibility frequencies and some synoptic climatology for North America), nough extremes as well as means are presented in the tables, charts and discussion. Recent aterial is evident in chapters on Tibet, Antarctica, etc. (for 3rd ed., 1937, *see* 3C–17, Mar. 952, *MAB*). *Subject Headings:* **1. Climate of continents 2. Climatic data 3. Textbooks.**—*I.R.*

6.4–2 55(02) 551.5(02)

†Namowitz, Samuel N. (*Washington Irving H. S., N. Y.*), and Stone, Donald B. (*Mount leasant H. S., Schenectady, N. Y.*), **Earth science. The world we live in.** N. Y., D. Van ostrand, **1953.** 438 p. numerous illus. (photos., charts, diagrs.), refs. at end of most chaps. **WB**—An attractive and well illustrated text on geophysics for high school students—the rst of its kind that has come to our attention. It consists of 5 sections or "units": (1) The ard and liquid sphere; (2) The stars, sun, planets, earth and other astronomical aspects, in- uding navigation and time reckoning; (3) The earth and its atmosphere; (4) The oceans nd currents and (5) Climatic factors and climates of the world. The emphasis on more ecialized knowledge covering a broad field like geophysics, rather than the general treatment forded by the several branches of geography, is illustrated in this modern text. *Subject Head- gs:* **1. Geophysics textbooks 2. Elementary meteorology 3. Textbooks.**—*M.R.*

6.4–3 551.506.1(71):629.13

*Canada. Meteorological Division, **General summaries of hourly weather observations Canada, 1953.** Toronto, [1954]. 2 pieces, about 300 p. each. almost entirely tables. t. 1, **British Manitoba.** Pt. 2, **Ontario, Quebec, Atlantic Provinces, Northwest Territories, ewfoundland.** Price: 50 cents for each part. **DWB**—Hourly observations of weather con- tions made at 150 airport stations in Yukon Territory, British Columbia, Alberta, Sas- tchewan, Manitoba (Part I); and in Ontario, Quebec, Atlantic Provinces, Newfoundland nd Northwest Territories (Part II), are summarized in detail for the year 1953 from punched rds. Station locations are described and coordinates given for each. Summaries include onthly amounts of low cloud cover in various categories (tenths), number of hours with rious cloud forms and types of precipitation, obstructions to vision; ceiling and visibility nditions taken simultaneously; and wind frequencies with ceiling and visibility combined. map shows location of each station. This is an excellent job of compilation and repro- uction. *Subject Headings:* **1. Airport meteorological data 2. Annual meteorological reports Punched card summaries 4. Canada.**—*M.R.*

6.4–4 551.589(02)

§Häfelin, Johann, **Im Reich der Wolken und Winde. Wetter und Wetterprognose, eine Darstellung für Jedermann.** [In the realm of clouds and wind. Weather and weather forecasting in a popular presentation.] Lucerne, Schweizer Volks-Buchgemeinde, **1954.** 264 p. 61 figs., 15 tables, 11 plates (incl. photos. of clouds). **DLC**—The first part of the book (p. 1–80) consists of a brief treatment of weather and forecasting from the point of view of the Swiss layman or student who is acquainted with scientific terminology but not interested in mathematical aspects. The major part of the book (p. 81–226) consists of a discussion of case histories of several types of weather experienced in the Alps during various seasons, from the synoptic climatology (or daily weather map) point of view (situations giving hot summer weather, local thunderstorms, föhn storms in mountains, cold waves, cold spells in winter, westerly (changeable) weather, heat waves in winter, widespread rain, snow, avalanches, storms and frost). Pt. 3 gives information on climate or weather and human activity, weather proverbs, singularities, artificial weather control, solar and lunar influences. *Subject Headings:* **1. Popular meteorology 2. Synoptic climatology 3. Textbooks 4. Switzerland.**—*M.R.*

6.4–5 551.586:612.014.43

Conference on Cold Injury, June 4–5, 1951, New York, **Cold injury; Transactions of the First Conference.** New York, Josiah Macy, Jr. Foundation, **1952.** 248 p. tables, figs., refs. **DWB**—This conference on cold injury was attended by the foremost investigators on the physiology and pathology of cold injury. Five papers were delivered and each one was subjected to a complete discussion by the various participants. The individual papers are as follows: Schumacker, Harris B., Jr., **Animal studies,** is concerned with the applicability of animal experimentation to the problem of regional cold injuries in man, injuries due to dry and wet cold, gangrene formation, injuries to somatic nerves, various sequelae chiefly the alteration in vasomotor and sudomotor function, experimental production of the immersion foot and trench-foot syndrome, etc. Crismon, Jefferson M., **Animal studies,** is concerned primarily with the specific effect of temperature as an injury factor. Howath, Steven M., **Homeokinesis,** is a discussion of the metabolic, endocrine, nerve and circulatory processes and mechanisms by means of which the body maintains a state of relative constancy at an optimum level for the most efficient functioning during cold injury. Talbott, John H., **Hypothermia,** deals with the physiological changes and reactions consequent upon artificial induction of hypothermia in human beings. Kark, Robert, **Acclimatization,** is an account of the metabolic endocrine and circulatory responses of man to exposures to cold of long and short duration. *Subject Headings:* **1. Cold effects on man 2. Acclimatization 3. Medical meteorology. I. Ferrer, M. Irené** (*ed.*) **II. Josiah Macy, Jr. Foundation.**—*I.L.D.*

6.4–6 551.506:519.2(02)

*Best, William H. and Panofsky, Hans Arnold (*Penna. State Univ.*), **Some applications of statistics to meteorology.** State College, Pennsylvania, Mineral Industries Extension Services, School of Mineral Industries, Penna. State College, **1953.** 103 p. 31 tables, 15 figs., eqs. **DWB**—Class notes for a course in statistical methods for Weather Bureau, Air Force and other meteorologists having no basic knowledge of statistics. The course attempts to develop useful techniques and to show some applications in meteorology and climatology. The separate chapters take up: I. Frequency distributions, II. Theoretical frequency distributions, III. Sampling theory, IV. Analysis of relationship between 2 variates, V. Time series, VI. Space variations of meteorological variables, VII. Analysis of relation between more then 2 variables, VIII. Nonlinear relations between 3 or more variables, IX. Statistical weather forecasting and X. Forecast verification. About 60 sub-subjects are discussed under these 10 major headings. *Subject Headings:* **1. Statistical methods in meteorology 2. Statistical analysis 3. Meteorology textbooks.**—*M.R.*

6.4–7 551.594.12:551.574.1

Gunn, Ross, **Diffusion charging of atmospheric droplets by ions, and the resulting combination coefficients.** *Journal of Meteorology,* 11(5):339–347, Oct. **1954.** 2 figs., 12 refs., 47 eqs. Also: Phillips, B. B. and Gunn, Ross, **Measurements of electrification of spheres by moving ionized air.** *Ibid.,* 11(5):348–351, Oct. **1954.** 4 figs., 4 refs., 2 eqs. **DWB**—Charging

f cloud droplets by diffusion of ions on to these droplets is investigated. It is found that hese droplets are neutral when formed. Neglecting small effects of space charge, expressions re found for average equilibrium free-charge carried by a droplet at rest and time-rate of ncrease of free-charge. The effective charging time at earth's surface is about 1000 sec agreeing with observed time of 20 min). The effect of motion with respect to ionized air is onsidered. It is found that ions of both signs diffuse to the drop surface and many are eutralized; from known rate of production equilibrium values are found. Expressions are erived for ionic combination coefficients of neutral and charged droplets. Calculated values f free-charge on a freely falling droplet agree with observed values. Experimental veri- cation is found in second article. PHILLIPS and GUNN describe apparatus for determining he charge on electrically isolated conducting spheres in a region of known positive and negative on concentration. Measurements show that the equilibrium charge is proportional to $\ln\left(\frac{N+\mu_+}{N-\mu_-}\right)$ where N is ionic density and μ is ion mobility. Absolute temperature, air flow nd radius of spheres are also factors. Results agree with theory set out by GUNN. *Subject Ieadings:* **1. Cloud physics 2. Electrical charging of clouds.**—*C.E.P.B.*

6.4–8 551.511:551.513

Kao, Shih-Kung, **The meridional transport of kinetic energy in the atmosphere.** *Journal f Meteorology*, 11(5):352–361, Oct. **1954.** 10 figs., table, 11 refs., 30 eqs. Also issued as: ohns Hopkins Univ. Dept. of Civil Engineering, Contract AF 19(122)-365, Scientific Report, Jo. 2, Oct. **1953.** 47 p. 10 figs., 10 refs., 52 eqs. **DWB**—In a mean zonal current with ellular or wave perturbation, the poleward kinetic energy transport depends on profile of onal velocity and orientation of trough and ridge lines. It is approximately proportional o (mean zonal velocity) × (poleward transport of westerly momentum). For Jan. 1949 ates of total transport, convergence and pressure force across latitudes 20–72½°N are com- uted. Greatest meridional energy transport is between 100 and 300 mb near westerly et center. Equatorward of 30° transport of existing kinetic energy about equals work by ressure force, but in middle and higher latitudes the former is ten times the greater. *Subject Ieadings:* **1. Energy transport 2. Zonal circulation.**—*C.E.P.B.*

6.4–9 551.5(02) 551.58(02)

Smosarski, Władysław, **Meteorologia, Wydanie II.** [Meteorology, Pt. II.] Poznán, Jakładem Pántswowego Wydawnictwa Naukowego, **1952.** 129 p. 12 figs., tables. Mimeo. .t head of t.p.: Wyzsza Szkoła Rolnicza w Poznaniu.—Lecture notes for a course in meteor- logy and climatology. No great amount of theory is presented, but on each of the standard ubjects (radiation, temperature, structure and composition of the atmosphere, water vapor, louds, winds and synoptic meteorology and climatology) statistical and graphical examples re given. Considerable emphasis is placed on radiative processes. *Subject Headings:* **. Meteorology textbooks 2. Climatology textbooks 3. Textbooks.**—*M.R.*

GENERAL METEOROLOGY

See also: **Devices in meteorology** (Delijanić), 6.4–85.

6.4–10 551.5:629.13:312.26

Cornell Univ. Guggenheim Aviation Safety Center, **Survey of research projects in the eld of aviation safety. Third annual supplement, Jan. 1954.** N. Y., Pub. by the Center, **954.** 106 p. Loose-leaf. Note: First survey was published Jan. **1951. DWB**—At least 2 research projects are listed under the heading meteorology, in this classified list of 1360 rojects. Other related projects are found under the headings: navigation, air conditioning comfortization), aviation, medicine, icing and weather hazards. A large number of these rojects are sponsored by the Geophysics Research Directorate. It is stated that 1953 was ne safest year in the history of domestic or overseas air transport, with 0.56 and 0.06 deaths er 100 million passenger miles, respectively, compared with 2.8 for passenger cars and taxis, 16 for interurban buses and 0.04 for trains (1952). *Subject Headings:* **1. Meteorological esearch projects 2. Aviation safety research 3. Mortality due to accidents.**—*M.R.*

6.4–11 551.5:629.13:37(02

International Civil Aviation Organization, **Aeronautical meteorological forecaster (aviation knowledge).** Its *Training Memorandum for Technical Assistance Missions, Par TA*/VII. [**1953?**] 66 p. List of training equipment (texts, periodicals, motion pictures) **DWB**—This manual contains aviation information necessary for the meteorologist who i engaged in aviation meteorological forecasting or training. Telecommunications, inter national organizations and publications are especially treated. *Subject Headings:* **1. Trainin manuals 2. Aeronautical meteorology. I. Persson, K. W. B. II. Roberts, C. W.**—*M.R.*

6.4–12 551.5:629.13:0

Körösi, György, **Időjárási tényezök szerepe a repülést irányító rádiószolgálatban.** [Rol of weather factors in the aviation broadcasting service.] *Időjárás*, 57(1):35–40, Jan./Feb **1953.** 2 figs. **DLC**—General problems of aviation meteorology and services rendered by th International Civil Aviation Organization are discussed. Importance of meteorologica assistance to aviators is illustrated by accounts of crash flights which could have been avoide if adequate meteorological information had been available. *Subject Headings:* **1. Aeronautica meteorology 2. Weather broadcasting.**—*G.T.*

6.4–13 551.5:629.13(04

Kraght, Peter E. (*American Airlines*), [**Basic weather information for business flyers.** *Business Flying for Commerce and Agriculture*, Madison, Wis., 1(3–12), 2(1–2), Nov. 1952 Oct. **1953.** 12 articles (2 p. each). figs., illus. **DWB**—Elementary report reading, basi knowledge of weather factors affecting aviation, and weather flying techniques recommende for pilots of varying experience are dealt with in a clear-cut, manner. Each article takes up particular problem as shown in the following list of titles (in the order of publication, fro Nov. 1952 to Oct. 1953): (1) Aviation weather; (2) Aviation winds aloft; (3) Aviation weathe and the weather map; (4) Clouds, rain, snow; (5) Aircraft icing; (6) Snow, sleet and freezin rain; (7) Airmasses, fronts and isobars; (8) Cumulus clouds and the haze level; (9) Airmas thunderstorms; (10) Thunderstorm line; (11) Fog and low stratus clouds and (12) Availabl weather services. Explanatory diagrams, illustrations and sample charts and tables ar included. *Subject Headings:* **1. Aeronautical meteorology 2. Elementary meteorolog 3. Popular meteorology 4. Flying weather.**—*G.T.*

6.4–14 551.5:629.1

Lederer, Jerome (*Dir. Cornell-Guggenheim Aviation, Safety Center, and Flight Safet Foundation, Inc., N. Y.*), **Some relationships between weather and air safety.** *Americ Meteorological Society, Bulletin*, 34(8):339–350, Oct. **1950.** 9 figs. **MH-BH**—An extensiv discussion of the effects of hoar frost and snow, ice, rain, hail, blowing snow and fog on ai safety, temperature inversions, lightning, gusts and turbulence, and flight planning in relation t atmospheric conditions. *Subject Headings:* **1. Aeronautical meteorology 2. Weather effect 3. Aviation safety.**—*I.L.D.*

6.4–15 551.5:629.13:632.

Rainey, R. C. and Sayer, H. J., **Some recent developments in the use of aircraft agains flying locust swarms.** *Nature*, London, 172(4371):224–228, Aug. 8, **1953.** 3 figs., 21 ref **DWB**—An account of progress in technique of spraying insecticides from aircraft agains locust swarms in flight, including use of meteorological data, especially in relation to swar movement. *Subject Headings:* **1. Aerial spraying 2. Locusts.**—*C.E.P.B.*

6.4–16 551.5:629.1

Sanders, J. O. (*Eielson Air Force Base, Alaska*), **Polar navigation.** *Navigation*, Lo Angeles, 3(4):104–108, June **1952. DWB**—Methods applied in polar navigation by the 58t Strategic Reconnaissance Squadron, such as the use of an additional grid on conventiona polar charts, of a local hour angle computer, of an astro-compass modified by the Squadro and of radar as a means of observing the ground surface are described. The difference betwee civil and navigational twilight is explained. The Doppler effect in radar reflection is discusse

It is pointed out that "radar is the only type of navigation used over the Alaska mainland." *Subject Headings:* **1. Polar navigation 2. Radar 3. Alaska.**—*G.T.*

6.4–17 551.5:629.13:06

[U. S. Civil Aeronautic Board], **Turbulence downed DC-6 in Gulf.** *Aviation Week*, New York, 61(3):49–81, July 19, **1954. DWB**—This text of the report prepared by the Civil Aeronautics Board relates all details of the thorough investigation conducted by the Board following the crash of a National Airliner off Mobile Bay, Ala. The report includes a detailed analysis of weather development at the time of the accident (Feb. 14, 1953) and of the wording and forwarding of weather reports. The Board concludes that "the probable cause of this accident was the loss of control followed by the inflight failure and separation of portions of the airframe structure while the aircraft was traversing an intense frontal-wave type storm of extremely severe turbulence, concerning the severity and location of which the pilot had not been fully informed." *Subject Headings:* **1. Aeronautical meteorological services 2. Turbulence 3. Flying weather.**—*G.T.*

6.4–18 551.5:629.13

U. S. Air Force-Navy-Civil Committee on Aircraft Design Criteria, **Climatic and environmental criteria for aircraft design.** *U. S. Air Force-Navy-Civil Committee on Aircraft Design Criteria, ANC Bulletin* 22, June **1952.** 65 p. figs., graphs, tables, numerous refs. at end of chaps. Wash., D. C. U. S. Govt. Print. Off. Price: $.35. **DWB**—A concise carefully prepared summary of meteorological and other data and facts needed for aircraft design in order to prevent damage. Twenty three pages are devoted to the composition of the atmosphere and the harmful effects of different gases, ozone, humidity, liquids, salt spray, fog, dew, rain solids, sand and dust, smoke, ice-fog, frost, snow, sleet, hail and ice, including test data and references to relevant papers. Another chapter deals with wind, thunderstorms, jet streams, hurricanes and tornadoes and with the effect of static electricity and lightning. Furthermore the solar radiation and temperature extremes are outlined and, finally, the effect of destructive insects, marine organisms, rot mildew and bacteria is summarized. *Subject Headings:* **1. Aeronautical meteorology 2. Aircraft design 3. Weather damage. I. U. S. Navy Bureau of Aeronautics II. U. S. Air Force. Air Research and Development Command III. U. S. Civil Aeronautics Administration.**—*A.A.*

6.4–19 551.5:629.13 (058)

U. S. National Advisory Committee for Aeronautics, **Thirty-ninth Annual Report, 1953. Administrative Report without Technical Reports.** Wash., D. C., Govt. Print. Off., **1954.** 61 p. "Research Publications," p. 43–53. **MH-BH**—On p. 40–41 the meteorological and icing investigations conducted by the NACA during the past few years are summarized. Specifically these include studies on atmospheric turbulence, cloud physics with respect to icing clouds, problems of ice protection or removal from planes, etc. The list of Reports (1059 to 1110), Technical Notes (2549–2993), Technical Memorandums (1323–1358) and Technical Papers by members of the staff published in various periodicals contains a number of meteorological studies. On p. 59 the 19 members of the Subcommittee (of NACA) on Meteorological Problems are listed. *Subject Headings:* **1. Aeronautical meteorology 2. Icing research 3. NACA. Publications 4. Membership lists 5. Annual service reports. I. Hunsaker, Jerome C.**—*M.R.*

6.4–20 551.5:629.13

Veranneman, Norbert L., **Meteorology and aviation.** *World Meteorological Organization, WMO Bulletin*, 2(1):20–25, Jan. **1953.** 2 figs. **DWB**—Modern requirements for meteorological information and forecasts to serve aviation are outlined. In-flight weather, wind and temperature information for take off and landing, visual range and slant visibility, etc. are discussed briefly. Accuracy of observations is stressed. *Subject Heading:* **1. Aeronautical meteorology.**—*M.R.*

6.4–21 551.5:92

Mr. R. H. Mathews, O.B.E., B.A., *Meteorological Magazine*, London, 82(969):65–67, March **1953.** photo. **MH-BH**—Retired Jan. 31, 1953 after nearly 40 years of Government

service. Transferred to Meteorological Office 1919. Forecasting for aviation until 1933 then in Iraq first Director of Iraq Meteorological Service 1936). From 1937 was meteorological officer in expanding Air Force, and in Jan. 1949 became Assistant Director, Climatology at Harrow. *Subject Headings:* **1. Biography 2. Mathews, R. H.**—*C.E.P.B.*

6.4–22 551.5:92

Brunger, Wilhelm, **In memoriam Ludwig Mecking (3.5.1879–20.10 1952).** *Petermanns Geographische Mitteilungen*, 98(1):1–2, **1954.** photo. **DWB**—MECKING was primarily a geographer. He wrote the meteorological parts of the Report of the German South Polar Expedition 1901–03 and also worked on the distribution and variations of ice in Baffin Bay. All his work was very accurate. *Subject Headings:* **1. Biography 2. Mecking, Ludwig.**—*C.E.P.B.*

6.4–23 551.5:92

Geiger, Rudolf (*Munich*), **Das weltumspannende klimatologische Werk von Wilhelm Meinardus.** [The world encompassing climatological work of Wilhelm Meinardus.] *Göttinger Geographische Abhandlungen*, No. 13, **1953.** 9 p. 6 refs. Abstracted from reprint. **DWB**—MEINARDUS devoted 127 of his 168 publications to meteorological and climatological problems, 40 of them to the Antarctic. A few items are added to the list of papers published previously by MEINARDUS himself (*Ibid.*, No. 1). The significance of his papers for a clear and comprehensive understanding of climatological problems is outlined and his working methods are analyzed. *Subject Headings:* **1. Obituaries. I. Meinardus, Wilhelm.**—*A.A.*

6.4–24 550.5:92

Retirement. Mr. S. T. A. Mirrlees. *Meteorological Magazine*, London, 82(978):380–382, Dec. **1953.** 7 refs. **MH-BH**—Joined Meteorological Section of Royal Engineers in 1915 and Meteorological Office in 1920. Served at outstations, General Climatological Division, Gibraltar 1939–42, and Head of R.A.F. Overseas Branch until retirement on Sept. 30, 1953. Author of several Geophysical Memoirs and other papers. *Subject Headings:* **1. Biography 2. Mirrlees, S. T. A.**—*C.E.P.B.*

6.4–25 551.5:92

Hawke, Eric Ludlow, **Dr. A. Crichton Mitchell, F.R.S.E.** *Royal Meteorological Society, Quarterly Journal*, 78(338):657, Oct. **1952.** Also: Watson, R. A., **Dr. Alexander Crichton Mitchell.** *Meteorological Magazine*, London, 81(960):189, June **1952. DWB**—Scottish geophysicist, born 1865, died April 15, 1952. Superintendent of Eskdalemuir Meteorological Observatory 1916–1922 and of Meteorological Office, Edinburgh, 1922–1925. Interests mainly terrestrial magnetism, also seismology. *Subject Headings:* **1. Obituaries 2. Mitchell, Alexander Crichton.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Polar navigation** (Sanders), 6.4–16; **Codes for weather reports** (Netherlands. Met. Inst.), 6.4–93; **Meteorological codes** (Netherlands. Met. Inst.), 6.4–94; **Wet bulb temp.** (Williams), 6.4–249.

6.4–26 551.501:551.579.5

American Geophysical Union. Committee on the Physics of Soil Moisture, **Report . . 1952–1953.** G. B. Bodman, Chairman. *American Geophysical Union, Transactions*, 34(6):938–944, Dec. **1953.** 2 tables. **MH-BH**—A list of projects under way in various institutions in the U. S. along the various lines of soil moisture physics (permeability, water flow, evapotranspiration, field capacity, drainage, temperature, etc.) and the workers engaged in these investigations are arranged by subject and by states. *Subject Headings:* **1. Soil moisture physics 2. Soil moisture research 3. United States. I. Bodman, G. B.**—*M.R.*

6.4–27 551.501:551.578.46

Butson, Keith D. (*U.S.W.B., Portland, Oregon*), **U. S. Weather Bureau snow cover observation program.** *Western Snow Conference, 21st, Boise, Idaho, April* **1953,** p. 5–6. 4 refs. **DWB**—Report on experimental observational techniques, based mainly on horizontal photographs of snow covered mountains. *Subject Headings:* **1. Observation technique 2. Snow surveys 3. Columbia River Basin.**—*A.A.*

6.4–28 551.501:551.578.4

American Geophysical Union. Committee on Snow, **Report . . . 1951–1952.** Forrest L. Rhodes, Chairman. *American Geophysical Union, Transactions,* 34(5):777–778, Oct. **1953. MH-BH**—Short reports on current research by the U. S. Corps of Engineers and the SIPRE, the Forest Service, Weather Bureau and the Division of Water Resources in California. *Subject Headings:* **1. Snow research 2. United States. I. Rhodes, Forrest L.**—*A.A.*

6.4–29 551.501:551.579.5

Olson, David F., Jr. and Hoover, Marvin D., **Methods of soil moisture determination under field conditions.** *U. S. Forest Service. Southeastern Experiment Station, Station Paper,* No. 38, April **1954.** 28 p. 5 figs., 35 refs. **DWB**—The authors describe and examine critically the gravimetric, electric, tensiometric and neutron scattering methods for determining soil moisture. *Subject Heading:* **1. Soil moisture measurement.**—*I.L.D.*

6.4–30 551.501:551.579.5:63

Richards, L. A., **The measurement of soil water in relation to plant requirements.** *Scientific Monthly,* 78(5):307–313, May **1954.** 20 refs., 5 figs. **DWB**—Discusses tensiometers, pressure cells, moisture-retention curves, moisture equivalent, wilting coefficient, etc. The green weight of plants is closely related to the average soil moisture stress during the experimental period. *Subject Headings:* **1. Soil moisture measurement 2. Agricultural meteorology.** —*A.A.*

6.4–31 551.501.1:551.577

Hoeck, E. (*École Polytechnique Federale, Zurich*), **Rapport du Comité pour la Mesure des Précipitations.** [Report of the Committee on the Measurement of Precipitation.] *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], v. 3:81–93, **1952.** 8 figs., 4 tables. **DWB**—A comprehensive discussion of leading hydrologists on the measurement of precipitation of slopes. Data presented for an experimental network on a small catchment in the Alps (Baye des Montreaux) show that rain gages with openings parallel to the slope catch 10–20% more rainfall. The rainfall variability was 5.7% with tilted gages and 17.5% with standard rain gages. Other data give a correlation coefficient of 0.97 for two stations with tilted gages and only 0.80 for standard gages. Comparative measurements were made with and without screens. The influence of the exposition of the terrain to the direction of winds bearing precipitation was discussed by means of the formula $P_p = P_h(1 \pm \mathrm{tg}\alpha\,\mathrm{tg}\beta)$; P_p—precipitation on the slope, P_h—on the horizontal surface, α—angle of the terrain to the wind direction, β—angle of the trajectories of precipitation with the vertical. *Subject Headings:* **1. Precipitation measurement 2. Orographic influences 3. Baye de Montreaux, Alps.**—*A.A.*

OBSERVATIONAL DATA

See also: **Weather observations** (Canada. Met. Div.), 6.4–2; **Statistics in meteorology** (Best, Panofsky), **6.4–6; Distribution of light** (Trojer), 6.4–179.

6.4–32 551.506.3:551.577.21:551.577.51(429)

*Bransby-Williams, George, **Some characteristics of mountain rainfall illustrated in North-west Wales.** *Water and Water Engineering,* 58(701):299–304, July **1954.** 4 figs., 5 tables. **DLC, GB-MO**—Snowdon Range with up to 172 in. a year is the rainiest part of the British Isles. The annual distribution is mapped, statistical data on variability set out and

annual variation discussed. Variability is compared with India, Assam and Ceylon. *Subject Headings:* **1. Rainfall distribution 2. Orographic rainfall 3. Wales.**—*C.E.P.B.*

6.4–33 551.506.7(534.5)

*Great Britain. Meteorological Office, **Upper air data for stations maintained by the Meteorological Office. Summaries of radio-sonde observations of temperature and humidity and of radar wind measurements at standard pressure levels 1948–50. Part 5. Aden.** London, H.M.S.O., **1954.** 8+36 p. 5 plates, 8 tables, 11 refs. At head of title: M.O. 555 (Pt. 5). Mimeo. **DWB**—Upper air records began June 1948. Extensive tables give for each month at 17 h and 5 h zone time, for 14 pressure levels 40 mb to surface, average temperatures, frequencies and standard deviations, heights in 1000 ft, relative humidity and mixing ratio, frequencies of wind direction and speed and vector resultants. Frequencies of pressures and temperatures at tropopause are also given. Plates show these means, frequencies and S.D.'s graphically and also mean temperatures for individual months. *Subject Headings:* **1. Upper air data 2. Aden.**—*C.E.P.B.*

6.4–34 551.506.8:551.583

Erkamo, Viljo (*Botanical Inst., Helsinki*), **On plant-biological phenomena accompanying the present climatic change.** *Fennia*, Helsinki, No. 75:25–37, **1952.** 6 figs., refs. **DWB**—Maps show the distribution in Finland of sorbus fennica, ash, maple, linden, vicciocarpus nataus and bidens radiatus. Phenological changes due to climatic variations, tabulated (partly since 1860) for birch and maple, bird cherry tree, meadow sweet, blueberry and raspberry show the effect of the longer growing period and of warmer summer. *Subject Headings:* **1. Phenology 2. Climatic variations 3. Finland.**—*A.A.*

6.4–35 551.506.8

*Franken, A. (*Mittelschulrektor i.R., Brackwede*), **Zur Phänologie der Forsythia.** [The phenology of Forsythia.] Hamburg, Meteorologisches Amt für Nordwestdeutschland, **1952.** 36 p. 16 tables, 3 figs., 7 refs. **MH-BH**—In view of the usefulness of Forsythia as a phenologic indicator, the author attempts to obtain more correct temperature summation for the development phases of this plant than those hitherto available. The experimental procedure involved the exposure of isolated Forsythia branches to various room temperatures, counting temperatures from Jan. 1 to the date of the beginning of blossoming and comparing the temperature summations with the blossoming of Forsythia bushes under natural conditions. A statistical analysis of the data on duration of developmental phases and blossoming dates and their relationship to temperature summation and temperature quotients leads to the following conclusions: the temperature summation rule is valid absolutely for the optimum temperature range (13–20°C); growth at minimum temperature (0–6.3°C) obeys a different law. A relatively stable temperature summation mean can be obtained by phenological observations carried over long period and the prediction of blossoming requires the precise forecasting of mean hourly temperatures. Winter blossoming was found to depend not only upon existing climatic conditions but also upon preceding fall and summer weather. *Subject Headings:* **1. Phenological observations 2. Forsythia.**—*I.L.D.*

6.4–36 551.506.8

Kárpáti, István and Kárpáti, Istvánné, **A növénytársulások évi periodikus ritmusának vizsgálata.** [Investigation of the annual periodicities of plant associations.] *Időjárás*, 57(6):334–354, Nov./Dec. **1953.** 5 figs., 21 refs. Russian and German summaries p. 334. **MH-BH**—In this article, which is primarily of botanical interest, methods of phenological observation of groups of plants (plant associations) are reviewed. The importance of making meteorological and micrometeorological measurements at the observation sites is emphasized. *Subject Heading:* **1. Phenology.**—*G.T.*

6.4–37 551.506.8

Lardinois, Emile, **Observations phénologiques á Uccle (I.R.M.) pour l'année 1951.** [Phenological observations at Uccle (Royal Met. Inst.) for 1951.] *Ciel et Terre*, 68(3/4):69–72, March/April **1952.** 4 tables. **MH-BH**—A general description of weather development

during the winter 1950–51 and spring and early summer 1951 at Uccle is followed by tables containing dates of the beginning of the blooming season for 52 species of plants for 1951 in juxtaposition with average dates for the period 1896–1940. Monthly temperature, insolation, precipitation and humidity data and their departure from long-period averages are also tabulated for Dec. 1950–Nov. 1951. *Subject Headings:* **1. Phenology 2. Uccle, Belgium.**—*G.T.*

6.4–38 551.506.8

Nuttonson, Michael Y., **Some preliminary observations of phenological data as a tool in the study of photoperiodic and thermal requirements of various plant material.** (In **Vernalization and Photoperiodism—A symposium.** Waltham, Mass., The Chronica Botanica Co., **1948.** p. 129–143. tables, graphs. *Lotsya: A Biological Miscellany*, v. 1.) Abstracted from reprint. **DLC**—It is suggested that through observation of plants growing under uncontrolled conditions sufficient data can be obtained for phenological studies. Data on the development of Marquis wheat, 4 varieties of flax, Alaska peas and Black Beauty eggplant are presented for various locations in the United States and Alaska in conjunction with average length of days and with degree days. Some preliminary conclusions are drawn. *Subject Headings:* **1. Phenology of crops 2. Photoperiodism 3. United States 4. Alaska.**—*G.T.*

6.4–39 551.509.8:633.1(82)

Pascale, Antonio Juan, **Mapa fenológico del maíz en la República Argentina.** [Phenological map of corn in Argentina.] *Meteoros*, Buenos Aires, 3(4):383–394, Oct./Dec. **1953.** 3 figs., 12 refs. Spanish and English summaries p. 383. **MH-BH**—Fairly detailed phenological charts of the agricultural regions of Argentina, showing isophenes of dates of sowing, tasseling and ripening of corn (maize), based on cooperative observers' records (network of the Phenological Service of Agrometeorological Department) for 1947–1952 are presented and discussed. Isophenes are drawn for every 10 days. Methods of analysis are also discussed. *Subject Headings:* **1. Phenological charts 2. Corn phenology 3. Argentina.**—*M.R.*

6.4–40 551.506.8(438)

*Poland. Pánstwowy Instytut Hydrologiczno-Meteorologiczny, **Rocznik Fenologiczny, 1949.** [Phenological Yearbook, 1949.] Warsaw, **1953.** all tables.—Data from 548 stations on nearly 300 phenological events (botanical and zoological) are treated systematically by regions. *Subject Headings:* **1. Phenological data 2. Poland.**—*M.R.*

6.4–41 551.506.8(438)

Riabinin, Sergiusz, **Z obserwacji nad sychronizasją przylotów niektórykh ptaków śpiewających ze stadiami rozwojowymi róslin.** [Observations of the synchronization between the arrival of some kind of singing birds and stages of plant development.] *Gazeta Obserwatora PIHM*, Warsaw, 4(7):5–7, July **1951.** 3 tables. **DWB**—Results of such observations carried out by the author in 1951 in Lublin and its suburbs and a comparison with earlier (1951) identical observations for Poznan' are presented and commented on. It is shown that the synchronization has been maintained in spite of variations in calendar dates. Lists of the synchronization of arrival of singing bird species with the development of plants based on the observations are included. *Subject Headings:* **1. Phenological observations 2. Bird migrations 3. Lublin, Poland 4. Poznan', Poland.**—*A.M.P.*

6.4–42 551.506.8(436)

*Rosenkranz, Friedrich, **Über die Veränderung phänologischer Daten in den letzten fünfundzwanzig Jahren.** [Change of phenological dates in the last 25 years.] *Wetter und Leben*, 6(1/2):19–21, March **1954.** tables. **DWB**—A comparison of phenological dates of specific indicators for the period 1928–1937 and 1946–1952 indicates an earlier appearance of phenological signs during the latter interval in early spring and especially in late summer. Data are given in tables for the various indicators and the corresponding reduction in number of days. *Subject Headings:* **1. Phenological data 2. Austria.**—*I.L.D.*

6.4–43 551.506.8:551.586:634(439.1)

Zerinvári, Elemérné, **Növényfejlődési megfigyeléseink a gyümölcsfákon.** [Phenological observations in orchards.] *Időjárás*, 54(5/6):154–155, May/June **1950. MH-BH**—A 20-point telecommunication code for reporting seasonal development of fruit trees is explained for the purpose of assisting workers engaged in the steadily expanding network of agro-meteorological observation stations sponsored by the Hungarian Meteorological Institute. *Subject Headings:* **1. Phenological codes 2. Agro-meteorological stations 3. Hungary.**—*G.T.*

6.4–44 551.506.9(52)

*Arakawa, H., **Meteorological observations made in Osaka for the period 1828–1833.** *Journal of Meteorological Research*, Tokyo, 4(6):337–342, Sept. **1952.** 2 figs., tables. In Japanese; English summary p. (22). **MH-BH**—Instrumental observations on air temperatures and barometric pressures for the period 1828–1833 were made by a well-known astronomer, S. Hazama. His results are tabulated and compared with the modern data reported by the government weather service. *Subject Headings:* **1. Historic weather records 2. Osaka, Japan. I. Hazama, S.**—*Author's abstract.*

6.4–45 551.506.9:06:632.1

Brandtner, Erwin, **Der Wetterschäden-Meldedienst, ein Sondernetz des Klimadienstes.** [The weather damage reporting service, a special branch of the climatic service.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:285–288, **1952.** fig., 4 refs. **DWB**—After a list of types of weather damage, a reporting form is reproduced which is to be distributed widely. These reports are then plotted, e.g. hail streaks. *Subject Headings:* **1. Weather damage services 2. Weather damage.**—*C.E.P.B.*

6.4–46 551.506.9:551.584

§*Gerhardt, John R.; Jehn, Kenneth H.; Guild, Walter R. and others, **Micrometeorological research data.** Texas. University, Electrical Engineering Research Laboratory, Contract N6onr-26602, Project HR-082-005, Reports Nos. 22 and 29, Nov. 10, **1948** and June 1, **1949.** 2 vol. entirely data. refs., v. 1, p. 4; v. 2, p. 4. **DWB**—Vol. 1, Average temperature, moisture and wind soundings for selected 24-hour observational periods during July, Aug. and Sept. 1948, are presented as the first published data to be obtained from the 300-ft micrometeorological tower installation near Manor, Texas. All soundings have been made at half hour intervals and each individual measurement is the average of five readings of five seconds each made over an approximate six minute period. Temperature and moisture gradients have been determined from rod-shaped thermistors while wind speed and direction gradients have been obtained from Bendix-Friez Aerovane recordings. The data are accompanied by synoptic summaries, and local weather observations. Vol. 2, Average temperature, moisture, and wind soundings for selected 24-hour observational periods during the months Sept., 1948 through Jan. 1949, are presented as the second volume of published data to be obtained from the 300-ft micrometeorological tower installation near Manor, Texas. The set-up was as described in v. 1. The data are accompanied by sea level synoptic charts, plots of selected radiosonde and pilot balloon observations, local weather observations, and a synoptic summary. *Subject Headings:* **1. Micrometeorological data 2. Observation techniques 3. Temperature profiles 4. Wind gradient.**—*Authors' abstract.*

6.4–47 551.506.9:92

Henderson, H. C. K., **Tobias Smollett as a weather observer.** *Weather*, 8(9):275–278, Sept. **1953.** table. **MH-BH**—Smollett, born 1721, went to Nice 1763–65 for his health and wrote letters describing the climate. He also made daily weather observations. A temperature table for 1764–65 is included. *Subject Headings:* **1. Weather comparisons 2. Nice, France 3. Smollett, Tobias.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **Daylight luminescence . . .** (Denver. Univ.), 6.4–174.

6.4–48 551.507.2:551.509

Roll, H. U., **Silbernes Fahrtenjubiläum der "Meerkatze."** [Silver jubilee voyage of the "Meerkatze."] *Wetterlotse*, No. 52:33–38, Feb. **1953.** 2 figs. **DLC**—On Feb. 7, 1953, the Fishery Protection ship made its 25th North Sea voyage (beginning 31.5.1950); it is also a floating weather station. Frequency of strong winds shown graphically. *Subject Heading:* **1. Weather ship "Meerkatze."**—*C.E.P.B.*

6.4–49 551.507.321.2:551.508

Canada. Meteorological Division, **Modifications to the M.S.C. Pibal timer.** Its *Cir.* 2096, *Ins.* 35, April 30, **1952.** 2 p. diagr., photo. **DWB**—The spring-clock-driven pilot balloon timer has been modified in several respects for use as a RABAL timer. It is intended to make time marks on the Canadian Radiosonde recorder chart as well as give audible signals at every minute, with additional 5- to 10-second warning pulses. *Subject Heading:* **1. Balloon timers.**—*Author's abstract.*

6.4–50 551.507.362:621.315

Best, Nolan R.; Lowell, Robert; Mazur, Daniel G. and Uglow, Kenneth M., **The AN/DKT-7( ) 15-Channel PPM Telemetering transmitter.** *U. S. Naval Research Laboratory, NRL Report*, 4016, June 16, **1952.** 25 p. 18 figs., 3 plates (fold.), foot-refs. **DWB**—Details are presented of a NRL design of a pulse-position modulation telemetering transmitter for use on medium sized rockets. It operates on 15 channels, weighs 18 pounds, has dimensions $9\frac{1}{4}\times11\frac{3}{4}\times9$ inches, and is contained in a pressurized core. Each of 15 channels is sampled 312.5 times a second, and 4 channels can be used to give a single channel with 1250 impulses a second. Flight calibrator, power supply, control unit and a 227 Mc receiver for use with AN/FKR-1 ground receiving and recording station are described as auxiliary equipment. Tests in laboratory and field indicate 1% accuracy with use of calibrator and 2% accuracy with only preflight calibration. *Subject Headings:* **1. Rocket instrumentation 2. Telemetering systems.**—*From authors' abstract.*

6.4–51 551.507.362:621.398

Packer, Donald M., **Geomagnetic field angular orientation indicator for a rocket.** *U. S. Naval Research Laboratory, Upper Atmosphere Research Report*, No. 19; *NRL Report* 4247, Nov. 25, **1953.** 16 p. 3 figs., eqs. **DWB**—An indicator has been developed for a rocket, flown day or night, that indicates through telemetering the orientation angles of the missile relative to the geomagnetic field with an accuracy of $2\frac{1}{2}°$. The work has been carried to the completion of a working laboratory model; the next step is to prepare units in a form suitable for installation in a particular rocket. The field-sensing unit consists of a many-turn coil rotated in the geomagnetic field by a motor that also drives a reference voltage generator. After the coil and reference voltage waves are squared in separate amplifiers, the phase angle between them is obtained with a simple phase-angle meter. The meter output is a telemeterable dc voltage; and its magnitude, a linear function of the orientation angle measured, is independent of rocket roll, magnitude of geomagnetic field strength, and electronic component characteristics. Scale calibration is automatically obtained each revolution of the rocket during flight. A geomagnetic and a solar indicator combined will furnish information necessary for determining the complete angular orientation of a rocket relative to a set of axes fixed in the earth. *Subject Headings:* **1. Rocket instrumentation 2. Telemetering systems.**—*Author's abstract.*

6.4–52 551.507.362

Packer, Donald M. and Tousey, Richard (*Naval Res. Lab. Wash., D. C.*), **A solar aspect indicator for a rocket.** *U. S. Naval Research Laboratory, NRL Report*, 4024, Sept. 5, **1952;** *Upper Atmosphere Research Report*, No. 17. 10 p. 7 figs. **DWB**—A small, lightweight and inexpensive photoelectric sensing unit has been developed that indicates, through telemetering

during flight of a rocket, the aspect and roll-rate data with an accuracy of better than ±2° over a field-of-view angle of 115°. The device consists of a simple, cemented-doublet lens that images the sun upon a thin hemispherical metal reticle conforming to the secondary focal plane of the lens, a chamber for collecting the sunlight passing through openings in the reticle, and a phototube for detecting this light. Since the aspect data are derived from the times of change of photocurrent and the geometry of the reticle, no calibration of the unit is required and telemetered information is independent of signal amplitude. The construction and operation of the indicator are described and the results obtained on a successful rocket flight are presented. *Subject Heading:* **1. Rocket instrumentation.**—*Authors' abstract.*

INSTRUMENTS

See also: **Pibal timer** (Canada. Met. Div.), 6.4–49; **Temp. measuring devices** (Stoll, Hardy), 6.4–326.

6.4–53 551.508.45

Müller, Hans Gerhard, **Über die Messung des Luftdrucks durch Bestimmung der Siedetemperatur mit dem Hypsometer.** [Pressure measurement by determining boiling temperature with a hypsometer.] *Germany. Deutscher Wetterdienst, Berichte,* No. 8, **1954.** 13 p. 5 figs., 5 tables, 13 refs. **DWB**—A survey of the physical properties of different liquids showed that C_6H_5Cl is best suitable for atmospheric pressure measurements at sea level and carbon disulfide (CS_2) for aerological purposes. Carbon tetrachloride (CCl_4) was less adequate. A carefully improved hypsometer which avoids a number of error sources is described. By measuring the vapor temperature with resistance thermometers (accuracy ±0.2°C), radiosondes could be constructed without any moving parts. The heating of CS_2 is accomplished at the ground only, because the heat capacity of the liquid is sufficient for further boiling. The accuracy of the hypsometer is much higher than that of the conventional equipment for radiosondes, especially at higher altitudes, where the error remains less than 1% (error of radiosondes up to 100%). *Subject Headings:* **1. Hypsometers 2. Pressure measurement 3. Radiosondes.**—*A.A.*

6.4–54 551.508.54

Höhne, Werner, **Ein Thermoelektrischer Feinwindmesser.** [Thermoelectric measurement of fine wind structure.] *Zeitschrift für Meteorologie,* 7(7):215–218, July **1953.** 3 figs., 2 refs. **MH-BH**—A description of construction and theoretical basis of a new hot wire anemometer is presented. It is based upon the principle of the heat transformer. The difference between this anemometer and the resistance anemometer, its sources of error and its advantages are discussed. *Subject Headings:* **1. Anemometers 2. Thermal resistance anemometer.**—*I.L.D.*

6.4–55 551.508.53/4

Sanuki, M.; Kimura, S. and Toyama, S., **A preliminary test of an anti-freezing combination wind vane and anemometer on the summit of Mt. Fuji.** *Papers in Meteorology and Geophysics,* Tokyo, 4(1):43–46, April **1953.** 3 figs., table, 2 refs. **MH-BH**—A Speedovane (an experimental combination wind vane and anemometer) was fitted with electric heaters and tested for about ten days in March 1953 on the summit of Mt. Fuji (station height, 3,773 m above sea level). From the test the total heater capacity of 650 watts is found sufficient for the anti-freezing purpose in ordinary icing conditions. *Subject Headings:* **1. Wind vanes 2. Anemometers.**—*Authors' abstract.*

6.4–56 551.508.54

Yamanaka, T., **On the experimental observation by snow-accretion proof anemometer (Part 1).** *Journal of Meteorological Research,* Tokyo, 5(2):111–112, March **1953.** 2 figs. In Japanese; English summary p. 111. **MH-BH**—Anemometer readings are usually incorrect in winter owing to snow accretion on the cups. To avoid this the author developed and tested two types of new instruments, a half-cylindrical model and an eddy-type model with three

receivers. The instruments are equipped with 125 W and 200 W heaters respectively. *Subject Heading:* **1. Anemometers.**—*Author's abstract.*

6.4–57 551.508.51(02)

Needham, A., **English weathervanes: their stories and legends from medieval to modern times.** Haywards Heath, Sussex, C. Clarke, **1953.** 102 p. 275 figs. **DLC**—This interesting book is made up mainly of sketches of wind vanes or weathercocks on churches, houses, etc. in England. It also gives a history of early devices such as flags and a diagram of the wind vane and indicator at Greenwich Observatory. *Subject Heading:* **1. Wind vanes.**—*C.E.P.B.*

6.4–58 551.508.59:629.13

*Brewer, Given A., **Calibrating PBY-6A airplane for meteorological purposes.** Woods Hole Oceanographic Institution, Contract N6onr-27702, Project NR-082-021, Technical Report, No. 25, Aug. **1953.** 36 p. 14+8 figs., 14 tables, 11 refs., eqs. **DWB**—As part of a continuing effort to reconstruct gust profiles during cloud traverses, an experimental program was carried out calibrating sensing instruments within a PBY-6A. Using multi-channel oscillographic equipment, four transducing instruments monitoring the aircraft's behaviour were simultaneously observed. Vector air-speed, Cg acceleration, pitch attitude, and altitude were continuously recorded oscillographically. The various transducing instruments were calibrated in the laboratory at the Woods Hole Oceanographic Institution and then transferred to a Navy PBY-6A for flight testing. The aircraft was subjected to a number of maneuvers in smooth air so that the performance of the instruments might be checked under known conditions. A number of steep pull-ups were executed and the oscillographic records for these maneuvers have been analyzed. It has been determined that for rates of vertical acceleration considerably greater than encountered during meteorological research, the velocities predicted from acceleration measurements agree with those deduced from altitude changes. (For condensed version *see* 5.11–40, Nov. 1954, *MAB.*) *Subject Headings:* **1. Gustiness measurement 2. Air-borne instrument calibration.**—*Author's abstract.*

6.4–59 551.508.54

Kassander, A. Richard, Jr.; Stewart, Robert M., Jr. and Falk, Harold, **A simple low-inertia anemometer of the three-cup type.** Iowa State College, Dept. of Physics, Contract AF 19(122)-440, Scientific Report, No. 3, April 1, **1954.** 20 p. figs., illus. **MH-BH**—This report describes the development, testing, and use of a three-cup type anemometer, the cup-wheel assembly of which is constructed of "ping-pong" balls. The anemometer has certain superior qualities with respect to ease of construction, ease of recording, low starting speed, and rapid response. With certain simple modifications it should be considered as a general purpose micrometeorological research tool. *Subject Heading:* **1. Cup anemometers.**—*Authors' abstract.*

6.4–60 551.508.53/4

Mazzarella, Daniel A., **Wind tunnel tests on seven aerovanes.** *Review of Scientific Instruments*, 25(1):63–68, Jan. **1954.** 6 figs., 3 tables, 12 eqs. **DWB**—Each of the Aerovanes used on the 420-ft meteorology tower at Brookhaven has been tested in one or more wind tunnels. An equation of motion is defined. Comparisons are offered in terms of the period of each instrument and its damping coefficient. Other comparisons include starting speeds, stopping speeds, and the effects of aging and unbalance on the performance of Aerovane propellers. The effect of yaw on the readings of windmill-type anemometers has been investigated further. An expression is given for the relationship between true speed, indicated speed, and angular displacement. The recovery time of an Aerovane propeller from rest can be expressed as a hyperbolic function of speed. *Subject Headings:* **1. Aerovanes 2. Anemometers.**—*Author's abstract.*

6.4–61 551.508.59:551.551

Hewson, E. Wendel (*Round Hill Field Station, M.I.T.*), **A method for determining parameters of turbulent flow through the whole vertical extent of the boundary layer.** *U. S.*

Air Force. Cambridge Research Center, Geophysical Research Papers, No. 19:165–170, Dec. **1952.** table. **DWB**—Zero-lift balloons were tethered by elastic strands to the cable of a kite balloon investigating wind fluctuations up to 1–2 km. The instantaneous wind speed and direction may be computed by means of photogrammetric techniques, using the drag coefficient for spheres and YOUNG's modulus for the elastic strands. Balloons of a certain size should not be used within a critical range of air speeds (Reynolds number of about 250,000), in which abrupt increases and decreases in drag occur without corresponding variations in air speed. *Subject Headings:* **1. Balloon gustometers 2. Turbulence measurement 3. Frictional layer.** —*A.A.*

6.4–62 551.508.59

Glaser, A. H. (*Univ. of London*), **The Pitot cylinder as a static pressure probe in turbulent flow.** *Journal of Scientific Instruments*, 29(7):219–221, July **1952.** 4 figs., 5 refs. **DWB**—An improved Pitot cylinder is proposed for use in investigation of short period static pressure fluctuations. The static pressure is obtained as the average of the pressure on two radial holes in the cylinder separated by a critical angular distance with a common tube to the manometer. The instrument gives a good accuracy in a fixed position for a natural wind of rapidly varying direction and speed. *Subject Headings:* **1. Wind pressure 2. Pitot tubes.** —*A.A.*

6.4–63 551.508.53/4:551.507.1

Miller, P. H. and Burgin, J. V., **Description and use of a portable wind measuring set.** *U. S. Naval Ordnance Test Station, Inyokern, China Lake, Calif., Technical Memorandum*, No. 1771, April 15, **1954.** 9 p. 4 figs. **DWB**—A Friez aerovane mounted on a Mk2 Mod 2 bomb carrier trailer 9 ft long, and used for rapid assembly, disassembly and transport over rough terrain is described and illustrated by photos and line drawings. It is capable of measuring wind direction and speed under conditions of continuous exposure to high winds and sand. It can operate with distances of 500 ft between transmitter and indicator without replacing No. 14 wire, and up to 1000 ft with No. 18 wire. Wind speeds are unreliable <3 knots and directions unreliable <5 knots. *Subject Headings:* **1. Portable wind measuring equipment 2. Friez aerovanes.**—*M.R.*

6.4–64 551.508.59:551.551

Guienne, Paul, **Mesure de la turbulence en vol.** [Measurements of turbulence in flight.] *France. Ministère de l'Air, Publications Scientifiques et Techniques*, No. 251:287–291, **1951.** 2 figs. **DWB**—Results of measurements made to 2500 m height during airplane and glider flights in France during 1949, with spheres and with hot wire anemometers, are plotted and discussed. Comparison is made between these results and those made in a wind tunnel. It can be seen that below 800 m considerable turbulence was encountered, but above 100 m the turbulence did not change with height; and no connection was found between turbulence and speed. Some temperature effect may have occurred since temperature fluctuations are recorded in the same manner by a hot wire anemometer as velocity fluctuations. *Subject Headings:* **1. Turbulence measurements in flight 2. Hot wire anemometers.**—*M.R.*

6.4–65 551.508.7:551.579.5(438)

Bac, Stanislaw, **Influence de la maniere de mesurer sur la determination de la hauteur des precipitations atmospheriques.** [Influence of the method of measurement on the amount of the atmospheric precipitation.] *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951* [*Transactions*], v. 3:33–43, **1952.** 5 tables, 2 figs. **DWB**—In connection with studies on the water balance of the soil, made by a battery of lysimeters in Putawy, the problem of precipitation measurement was investigated. Pluviometers with openings from 200–2500 cm² located at the earth's surface were compared with the conventional Hellmann rain gage (1 m height). The measured precipitation was definitely dependent on the size of the opening, resulting in about 20% more for the 2500 cm² area. Using the data from the greater opening, reasonable water balance was computed, while the monthly percolation in lysimeters was often higher than the rainfall amount caught in the conventional gage. *Subject Headings:* **1. Precipitation measurement 2. Lysimeters 3. Hydrologic cycle 4. Putawy, Poland.**—*A.A.*

6.4–66 551.508.7

Mehl, R. F. and Yang, Ling, **Some observations on heterogeneous condensation of metal crystals from the vapor phase.** Carnegie Institute of Technology, Contract AF 19(122)-185, Scientific Report, No. 4, June 1, **1953.** 22 p. 8 figs., 3 tables, 18 refs. **DWB**—Description and illustration of vapor effusion apparatus which was developed to measure critical supersaturation ratios for nucleation of metal crystals on various substrates, and another one to study the deposition of a metal by radioactive tracer technique. *Subject Heading:* **1. Vapor effusion apparatus.**—*M.R.*

6.4–67 551.508.71

du Chaxel, R., **Les corrections du thermometre mouille d'Avion.** [Airplane wet bulb thermometer corrections.] *Journal Scientifique de la Météorologie*, Paris, 5(19):102–115, July/Sept. **1953.** 3 figs., 2 tables, 3 refs. English and Spanish summaries p. 102. **DWB**—Tables, nomograms, scales and formulas are given, and described thoroughly and practically, for correcting wet bulb thermometer readings made in aeroplanes. The rules are for the purpose of rapid application of these corrections. The corrections considered are for 1) lag in wet bulb thermometers, 2) pressure, 3) for the part of the mercury column not exposed to the ambient, 4) thermometric correction, 5) ice pressure, etc. Some of these corrections are negligible. *Subject Headings:* **1. Wet bulb thermometer corrections 2. Correction tables 3. Nomograms 4. Air-borne instrument correction.**—*M.R.*

6.4–68 551.508.71

Goldsmith, P., **A method of increasing the range of the Dobson-Brewer aircraft frost point hygrometer.** *Great Britain. Meteorological Research Committee, M.R.P.*, No. 859, March 25, **1954.** Mimeo. 4 p. 4 figs., 2 tables. **DWB**—The Dobson-Brewer hygrometer fails below −130°F because ice deposit becomes unrecognizable. This is overcome by supplying hygrometer with compressed air. Test flights showed that increasing pressure from 238–1013 mb can increase range of hygrometer by 20°F. First results suggest a "tropopause-like" inversion of humidity about 44,000 ft. *Subject Heading:* **1. Dobson-Brewer frost point hygrometer.**—*C.E.P.B.*

6.4–69 551.508.71

Schopper, Erwin (*Weissenau, Germany*), **Über ein direkt anzeigendes Feuchtigkeitsmessgerät nach der Taupunktsmethode.** [A direct indicating humidity measuring device of the dew point type.] *Germany. Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Wissenschaftliche Arbeiten*, 1:138–144, **1947.** 4 figs. **DLC**—Device described in detail and illustrated. *Subject Heading:* **1. Humidity instruments.**—*M.R.*

6.4–70 551.508.71

Spencer-Gregory, H., **The psychrometer from aspects of the kinetic theory of gases, Part I.** *Instrument Practice*, London, 8(6):508–513, June **1954.** 2 tables, 6 refs., 32 eqs. **DLC**—The practical difficulties of accurate measurement of relative humidity with the psychrometer are discussed. The theoretical analysis of Svennson (1932) and the experimental work of Alty and Mackay (1935) are considered and the Gregory balanced temperature hygrometer is described. In this heat is supplied electrically to the wet bulb assembly to maintain equality of temperature between wet and dry bulbs. *Subject Heading:* **1. Psychrometers.**—*C.E.P.B.*

6.4–71 551.508.71

Väisälä, Vilho (*Helsinki Univ., Inst. of Meteorology*), **The lag coefficient of hygroscopic hygrometers, supplementary report.** *Helsinki. Universitet. Meteorologiska Institutet, Mitteilungen*, No. 74, **1953.** fig., 3 tables, ref. **DWB.** Also in *Geophysica*, Helsinki, 4(3):87–93, **1953. DLC**—A theory of the lag of hygroscopic hygrometers, especially of the hair hygrometer, is reported. There are two forms of the lag equation

$$U-U_s=\gamma\frac{dX}{d\tau} \quad \text{and} \quad U-U_s=\beta\frac{dU_s}{d\tau} \quad \text{with} \quad \gamma=\beta\frac{dU_s}{dX}=\beta U\text{'s.}$$

Here U is the relative humidity (%), U_s the reading of the hair hygrometer, X the relative lengthening of the hair ($X = 100(\Delta|/\Delta|_0)$, Δ = absol. lengthening of the hair from 0 to U_s%, $\Delta|_0$ from 0 to 100%) and τ = time. The functional dependence of U_s and X is given by the well known Gay-Lussac scale. γ is independent of humidity but it depends on air temperature and pressure as well as on the ventilation function. When the ventilation function is supposed to be directly proportional to the air density it follows that $\gamma = \varkappa(T/E)$. $\varkappa$ is nearly a constant, approximately $\varkappa = 5$. Thus

$$U = U_s + \varkappa \frac{T}{E}\frac{dX}{d\tau} = U_s + \frac{\varkappa}{U's}\frac{T}{E}\frac{dU_s}{d\tau}$$

or approximately $U = U_s + 5\frac{T}{E}\frac{dX}{d\tau}$. A humidity sounding through the trade inversion is corrected by means of this last formula. Discussion: PALMÉN, RAETHJEN, ROSSBY, VÄISÄLÄ and NYBERG. (For original report, *see item* 5.2–59, Feb. 1954, *MAB.*) *Subject Headings:* **1. Hygrometer lag 2. Hair hygrometers.**—*Author's abstract.*

6.4–72 551.508.72 551.573

Robertson, George W. (*Dept. of Transport, Canada*), **Latent evaporation: its concept, measurement and application.** Experimental Farms Service, Dept. of Agriculture, Ottawa, Ontario, Canada. Original paper presented Jan. 29, **1954,** at the regular weekly seminar of the Field Husbandry, Soils & Agricultural Engineering Div. 14 p. 6 figs., 18 refs., 7 tables, 2 eqs. **MH-BH**—The author defines latent evaporation as the maximum drying ability of the air measured by a black, plain horizontal surface fully exposed to all existing meteorological factors. A careful test with a series of conventional evaporimeters revealed that the black Bellani plate (diameter 7.5 cm, height above ground 4′), invented over 130 years ago, gives the highest correlation (R) with meteorological factors controlling evaporation: wind speed R = 0.27, temperature 0.46, vapor pressure deficit 0.72, solar energy 0.77. The corresponding values for a 4′ tank at the level of the soil surface were 0.23, 0.30, 0.46 and 0.60. The Bellani plate evaporated 2.4 times more than the 4′ tank from a unit surface. A rough method is explained how to relate the Bellani values to evapotranspiration from vegetation. A bookkeeping procedure shows the current soil moisture reserve. *Subject Headings:* **1. Evaporimeters 2. Evaporation measurement 3. Bellani evaporimeter 4. Evapotranspiration 5. Ottawa, Canada.**—*A.A.*

6.4–73 551.508.77 (02)

Canada. Meteorological Div., **Tipping bucket rain gauge.** *Canada. Meteorological Div., Cir.* 2194; *Ins.* 41: *Instrument Manual,* 41, Nov. 19, **1952.** 4 p. fig. **DWB**—The M.S.C. pattern tipping bucket rain gage and recorder is described and illustrated and instructions given for its installation, care and maintenance. *Subject Headings:* **1. Instrument manuals 2. Tipping bucket rain gages.**—*M.R.*

6.4–74 551.508.77

Condensation from clouds on Table Mountain. *South African Journal of Science,* 50(11): 303–304, June **1954. DWB**—Experiments made in 1903 by DR. MARLOTH of the German Weather Service on Table Mountain, S. Africa, showed that 79.84 in. fell in 2 months on a gage which had a bunch of reeds above it, whereas an ordinary gage caught only 4.97 in. in the same period. Current investigations by DR. J. GRUNOW of the German Weather Service in cooperation with the Union Weather Bureau on Table Mountain will show effects of various locations and degrees of sheltering by trees, etc. *Subject Headings:* **1. Fog drip 2. Rain gages 3. Rain gage exposure 4. Rainfall measurements 5. Table Mountain, South Africa. I. Marloth, —. II. Grunow, J.**—*M.R.*

6.4–75 551.508.77

Falk, O. (*Dir. Norwegian Bur. of Weights and Measurements*), **Limnigraph für Wasserstands- und Niederschlagsmessungen.** [Limnigraph for water level and precipitation

measurement.] *Die Wasserwirtschaft*, Stuttgart, 44(1):14–15, Oct. **1953.** 3 figs. **DLC**—Description with photos and sketch of a precipitation gage with automatic recording, which can be left unattended over a year. The water level in the tank is measured by the limnigraph principle with the difference that the height is detected by an electric contact after certain time intervals. The evaporation is considerably reduced by a floating cover. The remaining evaporation is recorded on the registration curve by a declining curve. *Subject Headings:* **1. Automatic recorders 2. Precipitation recorders.**—*A.A.*

6.4–76 551.508.77

Kirigin, Božidar (*Zagreb*), **Neka iskustva o postavljanju, punjenju i pražnjenju totalizatora.** [Some experiences in setting up, filling and emptying precipitation gages.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(1/2):15–17, Jan./June **1954. DWB**—Practical suggestions regarding the operation of the precipitation gages used by the Croatian Hydrometeorological Service since 1947. The suggestions include 11 points of instruction for the emptying of the instruments and determination of the precipitation amount. *Subject Heading:* **1. Precipitation gages.**—*G.T.*

6.4–77 551.508.822 551.524.7:551.590.24

Taylor, A. P., **Radio-sonde ascents during the solar eclipse June 30, 1954.** *Meteorological Magazine*, London, 83(989):337–338, Nov. **1954.** table, ref. **DWB**—To measure errors of radiosonde temperatures caused by insolation, ascents were made before, during and after eclipse at 8 British stations. Omitting anomalous results, apparent thickness of 300–100 mb layer averaged 189 ft less at maximum phase than before and after eclipse, in good agreement with temperature errors calculated by F. J. Scrase. Radiosonde at Camborne reached 100,950 ft (12 mb). *Subject Headings:* **1. Radiosonde errors 2. Eclipse temperature variations.**—*C.E.P.B.*

6.4–78 551.508.85:551.594.221

Hewitt, F. J., **The study of lightning streamers with 50 cm radar.** *Physical Society of London, Proceedings*, B, 66(10):895–897, Oct. 1, **1953.** 2 figs., 3 refs. **DLC**—Describes an equipment operating on a wave length of 50 cm (on which echoes from hydrometeors do not appear) for recording echoes from lightning up to a range of 30 km. It is set in operation by noise radiation on 600 Mc/s which always precedes radar echoes. Echoes from discharges within clouds were complex and extended over several km; discharges to ground gave a distinctive series of echoes following each stroke. *Subject Heading:* **1. Radar lightning recorders.**—*C.E.P.B.*

6.4–79 551.508.85:551.515.23

Jorgensen, Roy C. (*Dow Chemical Co., Freeport, Texas*), **New developments in using radar for hurricane tracking.** *Illinois. State Water Survey Div., Bulletin*, No. 41:301, **1952. DWB**—Brief note asking for cooperation from everyone operating radar for hurricane detection. Exchange of ideas and photographs and visiting each other's stations might assist in combatting the hurricanes. *Subject Headings:* **1. Hurricane tracking 2. Radar storm detection.**—*W.N.*

6.4–80 551.508.96

Gnanalingam, S., **An apparatus for the detection of weak ionospheric echoes.** *Institution of Electrical Engineers, London, Proceedings*, Pt. III, 101(72):243–248, July **1954.** 6 figs., 7 refs., 12 eqs. **DWB**—Transmitting frequency follows a cycle, increasing linearly for a time and then returning rapidly to the original value. A point some distance away receives each signal twice, by ground path and ionosphere reflection, the resulting interference giving an oscillation with beats at which there are wave discontinuities. The beat frequency can be detected with a narrow band filter. Wiring diagram, detailed theory, determination of echo height and calibration are described. With a transmitted power of 250 watts and output band width of 1 c/s, echoes could be detected with a reflection coefficient of 3×10^{-5}. Height determination is accurate to 1.4 km. *Subject Heading:* **1. Ionospheric recorders.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Silver jubilee voyage** (Roll), 6.4–48; **Active processes in troposphere,** 6.4–124; **Vertical lability** (Sakuraba), 6.4-132; **SW wind** (Isozaki), 6.4–170; **Rime forecasting** (Otta), 6.4–270; **Orographic rainfall** (Nakayama), 6.4–295.

6.4–81 551.509(09)

Duplančić, Čedomil K., **Pregled historijskog razvoja prognoze.** [Review of the history of forecasting.] *Split, Yugoslavia. Hidrografski Institut Mornarice. Meteorološki Otsjek, Vremenske Prilike,* 3(1/2):41–44, July **1948.** illus. **DWB**—The general history of meteorology and forecasting from its early beginnings to the present day is outlined in a popular manner. The use of radar is discussed as the most modern aid to forecasting. *Subject Headings:* **1. Weather forecasting 2. History of meteorology.**—*G.T.*

6.4–82 551.509(26)(02)

†Italy. Istituto Idrografico, **Norme per il servizio meteorologico a bordo delle navi.** [Norms for meteorological service on ship board.] Genoa, **1949.** 99 p. figs., tables, map (fold.). Its *Pub. I. I.* 3018. **DLC**—A manual for the guidance of navy observers and meteorologists including instructions for maintaining instruments and making observations, with conversion tables, code specifications, synoptic network and telecommunications arrangements in the Mediterranean and North Atlantic areas. The instructions are based on the codes and other regulations promulgated by the I.M.O. Conference of Directors at Washington in 1947 and are particularly adapted to observation, compilation of results, collecting reports, plotting and analyzing maps and making forecasts on ships at sea. A list of publications and aids for marine meteorologists is appended. *Subject Headings:* **1. Marine manuals 2. Code specifications 3. Ships observers manuals 4. Marine forecasting 5. Maritime weather services 6. Mediterranean 7. North Atlantic.**—*M.R.*

6.4–83 551.509:621.398

Saltzman, Percy, **The weather on television.** *Royal Meteorological Society, Canadian Branch, [Publications],* 5(2), March 25, **1954.** 11 p. Mimeo. **DWB**—Difficulties and problems in presenting weather on TV programs provides the basis for the talk and discussion presented in this paper. The experience of the author in the past 18 months (6 months on a Puppet Show, and 12 months on a news program) on the CBC network, covering Southern Ontario, shows that the balance between accuracy and showmanship is difficult to maintain in view of the diverse interests of the audience, sponsor, station operator, weather broadcaster and official Weather Service. *Subject Headings:* **1. Television weather broadcasts 2. Ontario, Canada.**—*M.R.*

6.4–84 551.509.1:621.394

Canada. Meteorological Division, **Faxpro.** *Its Cir.,* 2337, *FAX* 2, July 27, **1953.** 18 p. diagrs., photos. **DWB**—This "Procedure manual of the Canadian Weatherfax system" (1st ed., effective Aug. 1, 1953) gives complete details of operation of the Muirhead facsimile weather map transmitters and receivers introduced by the Meteorological Division. The equipment is shown in photographs and diagrams with indications of all parts involved in the operational processes. *Subject Headings:* **1. Facsimile map transmission 2. Canadian weather service.**—*G.T.*

6.4–85 551.509.1:621.394 551.5:621.8

Delijanić, I., **Moderna tehnička sredstva u meteorologiji.** [Modern devices in meteorology.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 2(1):11–12, Jan./March **1953.** **DWB**—Describes development of the French electronic map transmission system which was initiated in 1931. Also discusses use of television for weather reports in France and the United States. *Subject Headings:* **1. Facsimile map transmission 2. Television.**—*G.T.*

6.4–86 551.509.1

Gilchrist, B. and Cressman, G. P., **More efficient weather coding.** *American Meteorological Society, Bulletin,* 35(3):134–135, March **1954.** **MH-BH**—Present transmissions of

synoptic weather information make use of only 10 of the 27 useful keys on the teletype machine. If codes were revised to use letters (first 17) in addition to the 10 digits, 27×27 or 729 possibilities could be obtained in 2 code places instead of 10×10 or 100 as at present. A sample code for radiosonde transmission is presented requiring 18 groups instead of 29 (as at present) to give the same amount of information. Other possible codes are invited. *Subject Headings:* **1. Teletype transmissions 2. Synoptic codes 3. Transmission of reports.**—*M.R.*

6.4–87 551.509.1(45)

Italy. Ispettorato delle Telecomunicazioni e dell'Assistenza al Volo, **Regolamento del Servizio Meteorologico, v. 2, Servizi e Radiodiffusioni. Edizione 1952.** [Meteorological Service Regulations, v. 2, Service and radio dissemination. 1952 edition.] Its *Publicazioni, I.T.* 5, **1952.** 94 p. tables, diagr. (some fold.). **DWB**—An up-to-date handbook giving the networks and broadcast schedules for radio dissemination of synoptic analyses, regional airways forecasts, TAMET (terminal forecasts) and ROMET (route forecasts) forecasts, radiosonde reports, etc. An alphabetical list of Italian meteorological stations of different classes, numerical list (call number) of stations, a list of stations in various parts of Europe and their call numbers, latitude, longitude and elevation and, finally, a list of different code messages for various types of transmissions. *Subject Headings:* **1. Radio weather transmissions 2. Synoptic networks 3. Italy.**—*M.R.*

6.4–88 551.509.1

Jansá Guardiola, José M., **Primeros resultados obtenidos con el diagrama sinóptico mixto.** [First results obtained with the combined synoptic diagram.] *Revista de Geofísica*, Madrid, 12(45):4–48, Jan./March **1953.** Concluded in *Ibid.*, 12(46):123–139, April/June **1953.** figs., eqs. **DWB**—Continuing the work done by the author reported in *Revista de Geofísica*, 9(35):234–247, July/Sept., **1950** (*see item* 2.6–15, June 1951, *MAB*), the application of the space-time diagram to study of actual anticyclones and cyclones in Western Europe during various seasons is made and abundantly illustrated by time-space diagrams along both longitudinal and latitudinal axes. The use of these charts in short range forecasting by extrapolation of the time axis is brought out by several examples. The inclination of the barometric isolines (might be called isobars) gives a clue to the barometric tendency along a given axis. Undulatory isobars or formations indicate wave type pressure changes. *Subject Headings:* **1. Space-time diagrams 2. Pressure tendency forecasting.**—*M.R.*

6.4–89 551.509.1:621.394

Jones, Charles Reed (*Finch Telecom., Inc.*), **Facsimile.** New York, Murray Hill, **1949.** 422 p. 223 figs., glossary. Price: $6.00. **DWB**—A popular technical book that gives available information on (1) what facsimile is, (2) how facsimile works, (3) the present-day facsimile system and (4) servicing. Among the numerous applications of the facsimile system, the significance of transmission of original weather maps in time of peace and war, for navigation, and to remote places is briefly mentioned (p. 56–57). *Subject Heading:* **1. Facsimile map transmission.**—*W.N.*

6.4–90 551.509.1:621.396

Junaković, F., **Nešto o radio vezi u meteorološkoj službi.** [Radio communication in the meteorological service.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 1(3/4):63–68, July/Oct. **1952;** 1(5):100–104, Nov./Dec. **1952.** 5 figs. **DWB**—Current knowledge on ionospheric short-wave radio propagation is summed up. The effect of solar activity, of ionized clouds, of magnetic disturbances, etc. is discussed. The two-wave-length broadcasting technique of the Yugoslav Federal Broadcasting Center, which is destined to cover both short and long distance, is explained. *Subject Headings:* **1. Radio communication 2. Weather broadcasting 3. Yugoslavia.**—*G.T.*

6.4–91 551.509.1

Köröси, György, **Távközlés a meteorológia szolgálatában.** [Telecommunication in meteorology.] *Időjárás*, 56(1/4):77–81, Jan./April **1952.** 2 figs. Russian and French summaries p. 124–125. **Errata,** *Ibid.*, 56(7/8):251, July/Aug. **1952. DLC**—General descrip-

tion of the methods of communication used in meteorological services, such as telephone, telegraph, radio-telegraph, facsimile, television, teleprinter, automatic weather stations and radiosondes. *Subject Headings:* **1. Transmission of meteorological data 2. Communication networks.**—*G.T.*

6.4–92 551.509.1:621.394

Muirhead & Co., Ltd., **The Mufax chart recorder type D-649.** *Muirhead Technique*, Beckenham, Eng., 7(1):6–7, Jan. **1952.** illus. Also: **New Muirhead instruments at the 1953 Physical Society's exhibition.** *Ibid.*, 7(2):11–12, April **1953. A new weather map service.** *Ibid.*, 7(2):15–16, April **1953.** illus. **DWB**—Articles containing general descriptions and illustrations of the 18″ Mufax weather map transmitter (D-658) and recorder (D-649), of their operation and of charts transmitted by them. The receiver gives facsimile reproductions of maps fed to the transmitter. The two units may be connected over either wire or radio. Overseas transmission was successfully attempted and proved practicable even under conditions of severe radio interference which precluded any other form of radio reception. The proposed Canadian system of 100 Mufax transmitters and recorders (which will make Canada the first country with an automatic broadcast facsimile weather map service) is discussed. *Subject Heading:* **1. Facsimile map transmission 2. Canadian weather service.**—*G.T.*

6.4–93 551.509.1:551.501.1(02)

Netherlands. Meteorologisch Instituut, **Codevorm en codes voor het Synoptische Weerrapport, Ingaande 1 Januari 1949.** [Code form and codes for synoptic weather reports Jan. 1, 1949.] *Netherlands. Meteorologisch Instituut, [Uitgave]*, No. 131, **1948.** 23 p. forms. Price: f0.50. **DLC**—This edition of the 1949 international synoptic code as compiled for the Netherlands Meteorological Service, gives the code form and specifications for each group and each element, in detail, in the Dutch language. *Subject Headings:* **1. International meteorological codes, 1949 2. Code specifications 3. Manuals.**—*M.R.*

6.4–94 551.509.1:551.501.1(02)

Netherlands. Meteorologisch Instituut, **Zakboekje meteorologische codesingaande op 1 Januari 1949.** [Pocket edition of meteorological codes effective Jan. 1, 1949.] *Netherlands. Meteorologisch Instituut, [Uitgave]*, No. 133, **1948.** 83 p. tables, forms. **DLC**—The essence of several official Dutch language publications on the new codes (synoptic, aerological, ship, prognostic, analysis, POMAR, etc.) which were agreed on at Washington in Oct. 1947, and were made effective Jan. 1949, is condensed in a systematic fashion in this pocket-sized handbook for observers and decoders of all types. The code forms, meaning of each symbol and the tables of specifications and values for each number of each code are given. *Subject Headings:* **1. International meteorological codes, 1949 2. Code specifications 3. Observers manuals.**—*M.R.*

6.4–95 551.509.1:06:621.394

Ockenden, C. V., **World Meteorological Organization. Third Telecommunications Sub-Commission meeting, Paris, February 1952.** *Meteorological Magazine*, London, 81(960):171–173, June **1952.** Also his: **A new international meteorological communications centre at Frankfurt.** *Ibid.*, 83(982):122–123, April **1954.** fig. **MH-BH, DWB**—First article contains progress report on teleprinter circuits and facsimile apparatus for maps. Second—account with diagram of the reorganization of circuits forming the West European teleprinter network which came into operation on Jan. 4, 1954, based on Dunstable, Paris and Frankfurt. *Subject Headings:* **1. Communication networks 2. Facsimile map transmission 3. Europe.**—*C.E.P.B.*

6.4–96 551.509.1

Prager, —., **Wetterfunkerfahtungen im Nordmeer.** [Experience of weather broadcasts in the North Sea.] *Wetterlotse*, No. 51:24–31, Feb. **1953. DWB**—Notes from German fisheries guard boat "Meerkatze" in northern waters, 1950–52. Includes list of broadcasting stations and hints on observing air temperature on board ship. *Subject Heading:* **1. Radio meteorological networks.**—*C.E.P.B.*

6.4–97 551.509.1:621.396.9

Sutton, O. G., **The weather forecasts.** *Radio Times*, 123(1587):8, April 9, **1954.** 2 figs., table. **GB-MO**—As from April 11, more frequent and detailed forecasts will be broadcast. The personal approach recently adopted in television is described and a note given on using forecasts. *Subject Headings:* **1. Radio weather broadcasts 2. British Isles.**—*C.E.P.B.*

6.4–98 551.509.1

The Weather Bureau. *Long Lines*, New York, 32(5):10–11, 24, Nov. **1952.** illus. **DWB**—Communication facilities offered to the Weather Bureau by the Long Lines department of American Telephone and Telegraph Co. are specified. Speed in communications, an essential factor of efficient Weather Bureau work, is provided by Long Lines teletypewriter and facsimile networks and radioteletypewriter circuits. Some features of Weather Bureau activities are shown in annotated photographs. *Subject Headings:* **1. U. S. Weather Bureau 2. Communication networks.**—*G.T.*

6.4–99 551.509.1(26)

Wettermeldungen aus dem indischen und pazifischen Seeraum. [Weather reports from the Indian and Pacific ocean areas.] *Wetterlotse*, No. 78:232, Nov. **1954.** chart. **DLC**—Chart shows positions of coastal and island radio stations, E. Africa, S. Asia, E. Indies, Australia, New Zealand. *Subject Heading:* **1. Marine weather broadcasts.**—*C.E.P.B.*

6.4–100 551.509.2:621.396

Scorer, R. S., **How to broadcast the weather forecast.** *Weather*, 9(5):141–143, May **1954.** **DWB**—Account of Canadian weather forecast broadcasts and accompanying educational leaflets. A similar system is advocated in Britain. *Subject Headings:* **1. Radio weather broadcasts 2. Canada.**—*C.E.P.B.*

6.4–101 551.509.62:634.3

Brooks, F. A. (*Univ. of Calif. Agric. Experiment Station, Davis*), **Action of wind machines and heaters used for frost protection on calm clear nights.** *Washington State Horticultural Association, Proceedings*, 48:193–198, **1952.** 4 figs., 9 refs. Abstracted from reprint. **MH-BH**—It has been found more economical to use a combination of wind machine and heater in citrus orchards (67¢/acre/hr) than to use heaters alone ($3.60/acre/hr). The method might also apply to deciduous orchards, though an essential difference is that in the latter type of orchard there is a very shallow layer of more intensely cold air under the trees, which builds up from the ground or settle in pockets, whereas in evergreen (citrus) orchards the cold air forms on the tops of the foliage and settles down forming a deep uniform layer of moderately cold air under the tree. Response in the horizontal and vertical plane, to heaters alone, blowers alone and combined heaters and blowers is shown on isothermal charts and time sections for calm, clear nights. Data were obtained at Riverside, Calif. *Subject Headings:* **1. Frost protection of orchards 2. Frost prevention 3. Frost fans 4. Orchard heaters 5. Citrus orchards 6. Riverside, Calif.**—*M.R.*

6.4–102 551.509.62:551.574.42:632.1

Modlibowksa, Irena, **Some experiments on "washing off" the hoar frost.** *Commonwealth Bureau of Horticulture and Plantation Crops, East Malling, England, Annual Report, 1952:*73–77, pub. **1953.** 3 figs., 2 tables, 8 refs. **GB-MO**—Potato and strawberry plants below freezing point were sprayed with water before thawing. The effect was only beneficial if plants were sprayed before damaging temperature was reached and if frost was not so severe that plants fell to damaging temperature after spraying. Spraying may even be harmful. *Subject Heading:* **1. Frost protection.**—*C.E.P.B.*

6.4–103 551.509.62

Primault, B. (*Zurich, Switzerland*), **Leçon à tirer d'une nuit de gel.** [A lesson to learn from a frosty night.] *Revue Romande d'Agriculture, de Viticulture, et d'Aboriculture*, 9(10):81–82, [**1953?**] 6 figs. At head of p. 1: Communication de la Station Centrale Suisse de Me-

teorologie. Abstracted from reprint. **DWB**—Two experimental plots were set up to determine temperature and frost effects in a protected area with a given number of grape vines, with bare ground and with cut grass cover, respectively. On May 11, 1923, over 50% of the vines were frosted in the bare-ground plot, whereas only 1% or less in the grassy plot were damaged. Distribution of damage (shown on a diagram) indicates there was a microclimatic effect, perhaps due to air drainage. *Subject Headings:* **1. Frost damage to vineyards 2. Microclimatic frost distribution 3. Frost pockets 4. Cover effects on frost damage 5. Zurich, Switzerland.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

6.4–104 551.510:551.1

Eriksson, Erik (*Stockholm*), **Atmosfärens ursprung och historia.** [The origin of the atmosphere and its history.] *Teknisk Tidskrift*, Stockholm, 84(19):421–426, May 11, **1954.** 8 refs. **DLC**—This article discusses in technical language the composition of the earth's atmosphere, its origin, cycles of evolution or balance, atomic decay products, CO_2 balance, chemical reactions and biochemical processes in the atmosphere. Some illustrative data are included. *Subject Headings:* **1. Origin of atmosphere 2. Atmospheric composition 3. Atmospheric evolution.**—*M.R.*

6.4–105 551.510.4:52

Michard, R., **L'atmosphere terrestre, source de difficultes pour l'astronome. [Pt. I]** [The terrestrial atmosphere, source of difficulties for the astronomer. Pt. I.] *L'Astronomie*, Paris, 67:465–468, Dec. **1953.** 2 figs. **[Pt. II.]** *Ibid.*, 68:59–64, Feb. **1954.** fig. ref. **DWB**—The first article is a general discussion of effect of atmosphere on astronomical observations and particular treatment of problem of refraction, turbulence, and scintillation. The second discusses absorption, luminosity, diffusion and airglow. A novel chart shows for the various wave lengths (>100 M to 1 Å) the transparency and effect of the atmosphere, dust, water vapor, ozone, ionosphere, etc., the instruments used to measure the radiations and the antennas or receivers for each broad band. *Subject Headings:* **1. Atmospheric effects on astronomical observations 2. Refraction 3. Turbulence effects in astronomy 4. Scintillation 5. Absorption 6. Radiation instruments.**—*M.R.*

ATMOSPHERIC POLLUTION

6.4–106 551.510.42:581.056

Hirst, J. M., **Changes in atmospheric spore content: diurnal periodicity and the effects of weather.** *British Mycological Society, Transactions*, 36(4):375–393, **1953.** 5 figs., 7 photos, 23 refs. **DA**—Previous methods of collecting spores are criticized. An automatic volumetric suction trap is described, which is independent of wind speed. Results showing diurnal variation of different spores over a period are illustrated and discussed in relation to weather. *Subject Heading:* **1. Aerobiology.**—*C.E.P.B.*

6.4–107 551.510.42:551.591

Hurst, G. W. and Caton, P. G. F., **Smoke haze observed from an aircraft.** *Meteorological Magazine*, London, 82(975):281–282, Sept. **1953. DWB**—Jan. 8, 1953, 1420–1600 G.M.T. a flight north through Midlands showed pollution by industrial sources many times greater than by domestic. Top of smoke haze at 2000 ft, but not enveloping hills at 1100 ft. *Subject Headings:* **1. Smoke haze 2. Midlands, England.**—*C.E.P.B.*

6.4–108 551.510.42:357.1

Hyland, Stanley, **The war against smoke. Some early campaigns.** *Smokeless Air*, 24(89):123–125, 128, Spring **1954.** fig. **DWB**—Describes the genesis of the first smoke abatement act, due to M. A. Taylor (1819), Select Committees of 1843–46 (which however

endorsed the open grate), Act of 1853 to abate nuisance of smoke from furnaces and steam vessels in London, and other measures. *Subject Heading:* **1. Smoke abatement.**—*C.E.P.B.*

6.4–109 551.510.42:628.53

Martine, W. R., **Towards clean air via smokeless zones.** *Smokeless Air*, 24(90):198–201, Summer **1954.** 9 refs. **DLC**—Smokeless zones were suggested by C. GANDY in 1935. Since then two have been established and authority obtained for 17 others. A "smokeless zone" is defined and causes of failure of proposals for zones in various towns set out. *Subject Heading:* **1. Smoke abatement.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Bibliography on Ionospheric Propagation,** 6D–1 to 6D–303, p. 489–547.

6.4–110 551.510.52

*Telegadas, Kosta and London, Julius, **Physical model of the Northern Hemisphere troposphere for winter and summer.** New York Univ. College of Engineering. Research Div., Contract AF 19(122)-165, Scientific Report, No. 1, Feb. **1954.** 55 p. 15 figs., 9 tables, 24 refs., eqs. **DWB**—The physical parameters of the atmosphere such as pressure, temperature, water vapor and cloudiness are presented for average latitudinal and vertical conditions in the troposphere for winter and summer. The latitudinal and vertical distributions of temperature are shown in graphical form with tabulated data (from the surface to 19 km) of averaged latitudinal values of temperature and pressure. Total cloudiness and relative humidity charts for the 850, 700 and 500 mb levels are presented on a hemispheric basis. Also mean winter and summer tropospheric relative humidity distributions and cloud distributions by height, type, amount and percentage of overlapping clouds are given graphically and in tables. The effect of using average latitudinal temperature and relative humidity values to calculate the specific humidity in the lower atmosphere is discussed. It is shown that no appreciable error is introduced by using average latitudinal values to calculate the average specific humidity. *Subject Headings:* **1. Troposphere 2. Northern Hemisphere charts.**—*Authors' abstract.*

6.4–111 551.510.53 551.594.51 550.385

California Institute of Technology, **Upper atmospheric research.** Contract DA36-03-sc-34; Progress Report for the Second Quarter, July 1–Oct. 1, 1950, pub. Oct. 1, **1951.** 33 p. refs. **DWB**—The field covered in this second report includes corpuscular influences, the theory of auroras and magnetic storms and meteor evidence on upper atmosphere winds. Attached are: Chapman, Sydney, **Upper atmospheric nomenclature** (also published in *Journal of Geophysical Research*, 55(4):395–399, Dec. **1950;** *see* 2.6–40, June 1951, *MAB*) and *Idem*, **Notes on aurorae and magnetic storms, I. Considerations as to a model experiment** (also in *Journal of Atmospheric and Terrestrial Physics*, 1(3):189–199, **1951;** *see* 2.9–179, Sept. 1951, *MAB*). *Subject Headings:* **1. Auroras 2. Magnetic storms 3. Upper atmosphere research. I. Pickering, W. H. II. Chapman, Sydney.**—*G.T.*

6.4–112 551.510.53 550.385

†California Institute of Technology, **Upper atmospheric research.** Contract DA 36-039-sc-34, Progress Report for the Fourth Quarter, pub. March 31, **1951.** 139 p. figs., tables, refs., appends. **DWB**—A study was conducted to coordinate and analyze existing data on the the upper atmosphere and to determine the most promising new approach to upper atmosphere problems. Topics in the study included: temperature determinations and air sampling by rockets, wind and turbulence, duration of the ionization and luminosity of meteor trails, simulated meteor trails, corpuscular influence, magnetic disturbances and ionospheric phenomena, polar-current system of magnetic storms, electrojet (local intensification of electric currents manifested in the daily geomagnetic variation), influence of cosmic rays, general circulation, absorption layers, air glow, and new nomenclature. *Subject Headings:* **1. Upper atmosphere research 2. Magnetic storms. I. Pickering, W. H. II. Chapman, Sydney II. Bhattacharya, Prabhat K. IV. Chiu, Wan-cheng.**—*TIPS, Abstract No. U18903.*

6.4–113 551.510.53

Elvey, C. T., **Optical phenomena of the upper atmosphere.** *Alaskan Science Conference, 2nd, Mt. McKinley National Park, Sept. 4–8, 1951, Proceedings*, p. 288, pub. **1953? DWB**—General discussion of the various scattering, absorption and emission phenomena of the upper atmosphere and the knowledge of temperature, density and composition of the atmosphere derived therefrom. *Subject Headings:* **1. Upper atmosphere composition 2. Optical phenomena.**—*M.R.*

6.4–114 551.510.53

Ionospheric and upper air research. *Physics Today*, 6(3):10–13, March **1953.** 4 figs. **DWB**—Outlines the activities of the Ionospheric Laboratory, the Upper Air Laboratory and the Upper Air Research Observatory, working under the Geophysical Research Directorate of the Air Force Cambridge Research Center. Some of the problems now under study are sporadic E clouds, physics of auroras, properties of the upper air, rocket soundings and solar terrestrial relations. For the latter purpose a 16″ apochromatic coronograph will be installed at Sacramento Peak, New Mexico. *Subject Headings:* **1. Upper atmosphere research 2. Ionospheric research 3. Solar-terrestrial relationships I. U. S. Air Force. Cambridge Research Center. Geophysics Research Division.**—*A.A.*

6.4–115 551.510.53:551.524.7

Ley, Willy, **Die Grenze der Atmosphäre.** [Limits of the atmosphere.] *Beiträge zur Weltraumforschung und Weltraumfahrt*, Stuttgart, No. 3:4–8, Dec. **1949.** 2 tables. Mimeo. **DLC**—Brief historical review of knowledge on the height of the atmosphere. The latest available data for the vertical distribution of temperature, density, sound velocity and mean free path are given up to 300 km, based mainly on American research (U. S. NACA, GRIMMINGER). *Subject Headings:* **1. Height of atmosphere 2. Upper atmosphere research 3. Vertical temperature distribution.**—*A.A.*

6.4–116 551.510.53:523.38:535

Link, F., **Sondages optiques de la haute atmosphère a l'aide des éclipses de lune.** [Optical soundings in the upper atmosphere at lunar eclipse.] *I.U.G.G. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:502–503, **1950.** 3 refs. **DWB**—Calculation of the optical density from the center to the edge of the umbra during a lunar eclipse shows that differences between observed and calculated values (using data on atmospheric density up to 50 km obtained by aerological and acoustical soundings) can only be explained by the influence of atmospheric pollution from 0–100 km—possibly due to meteoric dust. A study of the penumbra of the eclipse of Nov. 19, 1945 gives thus far no clue to the structure of the atmosphere, though a dissymmetry toward the evening side must be further investigated. *Subject Headings:* **1. Optical soundings 2. Lunar eclipses 3. Atmospheric pollution 4. Upper atmosphere.**—*M.R.*

6.4–117 551.510.53

Massey, H. S. W., **The nature of the upper atmosphere.** *Endeavour*, London, 13(50):81–85, April **1954.** 4 figs., 6 refs. **DLC**—General but semi-technical treatment of structure and composition of the high atmosphere, the ionosphere, aurora and airglow according to latest results of rocket and radio research. *Subject Headings:* **1. Upper atmosphere structure 2. Auroras 3. Rocket observations.**—*M.R.*

6.4–118 551.510.53 551.524.61(98)

Probe air above geomagnetic pole. *Science News Letter*, 64(6):89, Aug. 8, **1953. DWB**—Brief report on "Project Muskrat," an expedition in the summer of 1953 to northern Greenland on the U.S.S. Staten Island. The expedition is equipped with Geiger counters and ionization chambers which will be carried by rockets launched from balloons at 70,000 ft altitude. The "Rockoon" technique of launching balloon-borne "Deacon" rockets (developed by JAMES A. VAN ALLEN, Iowa State Univ.) is described. Primary purpose of the expedition is to measure cosmic ray intensity; atmospheric pressure, density and temperature measurements are also

anned. *Subject Headings:* **1. Upper atmosphere research 2. Cosmic ray research 3. Arctic xpeditions.**—*G.T.*

6.4–119 551.510.534

Clark, D. D., **Discussion on ozone.** *Weather*, 8(12):369–370, Dec. **1953. MH-BH**—eport of discussion at Meteorological Office, London, Oct. 19, 1953, on paper by K. Langlo amount of ozone and its relations to meteorological conditions. (*See* 4.10–8, Oct. 1953, *AB.*) *Subject Headings:* **1. Ozone variations. I. Langlo, K.**—*C.E.P.B.*

6.4–120 551.510.534:551.521.61

*†Darling, B. T. and Weiss, J. A., **On the theory of the ozone molecule.** Ohio State Univ. esearch Foundation, Contract AF 19(122)-65, Scientific Report IA-6, June **1953.** 131 p. figs., 11 tables, 40 refs., eqs. **DWB**—The history and literature on investigations of ozone means of infrared spectroscopy and later (1952) microwave spectroscopy is reviewed and e theory of the structure, including an analysis of the rotational structure of the principal nds, the potential energy function, the symmetry properties of the states, etc. and methods calculation, are given in detail. The problem is by no means completely resolved. *Subject eadings:* **1. Ozone molecule structure 2. Infrared spectroscopy of ozone 3. Microwave ectroscopy.**—*M.R.*

6.4–121 551.510.534

Vigroux, Ernest, **Photométrie d'une éclipse de lune. Répartition de l'ozone.** [Photometry of an eclipse of the moon. Ozone distribution.] *Académie des Sciences, Paris, mptes Rendus*, 239(4):339–341, July 26, **1954.** 2 figs., ref. **DWB**—Curves showing the ight distribution of ozone (Jan. 1953) are presented on the basis of measurements of the nsity of shadow in the visible ranges of spectra corresponding to trajectories varying widely th altitude at closely neighboring latitudes. *Subject Headings:* **1. Ozone distribution Lunar eclipses 3. Earth's shadow.**—*Trans. of author's abstract.*

6.4–122 551.510.53:551.547:551.511

Yerg, Donald G., **Applicability of continuous fluid theory in the higher atmosphere.** nnsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, ientific Report, No. 49, Sept. 10, **1953.** 31 p. 2 tables, 5 refs., eqs. **MH-BH**—The use the equation of motion and the equation of state in the higher atmosphere implies a macroopic viewpoint and assumes that the atmosphere may be treated as a continuous medium. umerical criteria for the applicability of the concept of a continuous medium are established terms of the gradients of density, temperature, or pressure and the requirements for a atistical distribution of molecules within an elemental volume. It is found that the atosphere may be treated as a continuous medium to heights above the F region, if the equations motion are modified to include higher order pressure derivatives. Careful consideration ust be given to the definition of pressure, temperature, and density. The use of a second der pressure term in the hydrostatic equation indicates that the pressure decreases less pidly with height than in conventional equations. The modifications of the viscous stress pear as a special case of the general continuous medium problem. *Subject Headings:* **Physics of the atmosphere 2. Upper air pressure.**—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Transport of energy in atmos.** (Kao), 6.4–8; **Fluid theory for higher atmos.** (Yerg), 6.4–122; **Momentum transfer** (Rogers), 6.4–143; **Energy of anticyclones** (Ando), 6.4–156; **Vertical motion and advection** (Fleagle), 6.4–247.

6.4–123 551.511:551.55

Béll, Béla, **Gyakorlati módszerek a hőmérsékleti advekció meghatározására.** [Working ethods for determining thermal advection.] *Időjárás*, 57(6):350–359, Nov./Dec. **1953.** figs., 2 tables, 8 eqs. Russian and French summaries p. 350. **MH-BH**—A method is

explained whereby thermal advection can be determined by means of the thermobaric fields charts of 500/1000 mb relative and 700 mb absolute topography. A nomograph for quic computation of thermal advection values from radiosonde and pilot balloon data is describe and illustrated. *Subject Headings:* **1. Advection 2. Heat transfer 3. Nomographs.**—*G.T.*

6.4–124 551.511:551.5

Dahler, H., **Neue Anschauungen über die wetterwirksamen Vorgänge in der Troposphä und deren Vorhersage. Teil I: Problemstellung. Labilisierung und Stabilisierung durc Advektion.** [New outlook on the active processes in the troposphere which influence weath and their forecasting, Pt. I, Presentation of the problem. Advective instability and stability *Zeitschrift für Meteorologie*, Berlin, 8(1):1–11, Jan. **1954.** 2 figs., 17 refs. **MH-BH**—Owin to the non-measurable character of the vertical components of the tropospheric streams it necessary to resort to the empirically established fact that advection plays a decisive role weather processes and that, hence, it is associated with vertical motions. The advecti components of total temperature change (total thickness change) can be measured direct only by means of local instantaneous values of thickness variations of the relative topographic these calculations are based upon the values of the upper air winds. Owing to the troposphe temperature compensation, the surface integral $\int v^2 da$ in the polar diagram of the upper a winds is of immediate importance to the anisobars and the associated vertical motions whic influence weather. Also vertical wind shear and surface friction are important in instantaneou advective changes. The equations for calculating the instantaneous advectively produce temperature changes within a given thickness over a particular place are given and an actu calculated example is shown. With the aid of this equation the author discusses the proce of stability and instability resulting from advective temperature changes. *Subject Heading* **1. Advective temperature change 2. Stability 3. Instability 4. Weather forecasting.**— *I.L.D.*

6.4–125 551.511:551.5

Ogura, Yoshimitsu (*Geophysical Inst., Tokyo Univ.*), **Note on the theory of turbule diffusion in the lower layer of the atmosphere.** *Meteorological Society of Japan, Journa* 31(4):125–131, April **1953.** 3 figs., 13 refs., 16 eqs. Also issued as: *Tokyo Univ. Geophysic Institute, Collected Meteorological Papers*, No. 61, Sept. **1953. MH-BH**—In this paper th author deals theoretically with the vertical turbulent diffusion of minute particles emitte continuously from a line source in the lower layer of the atmosphere, taking into considerati the non-homogeneity of turbulence in that layer. Assuming the scale of the largest turbule element at any point to be in proportion to the height from the ground surface, and also a suming TAYLOR–VONKÁRMÁN correlation coefficient of vertical turbulent wind velociti to be of a reasonable functional form, the shape of diffused smoke is determined theoretical following the same procedure as that used in previous papers of the same author. By mea of results obtained here, it is to some extent made clear how far the turbulent diffusion in th homogeneous atmosphere differs from that in the lower layer of the real non-homogeneou atmosphere. *Subject Headings:* **1. Turbulent diffusion 2. Turbulence theory.**—*Author abstract.*

6.4–126 551.511:551.515.1

Petterssen, Sverre, **An essay on development.** Chicago. Univ. Dept. of Meteorolog Contract AF 19(604)-390, Technical Report, No. 3, May **1954.** 19 p. 2 figs., eqs., 4 ref **MH-BH**—SUTCLIFFE's theory of development is reviewed and extended with particul reference to cyclonic development at sea level. It is shown that baroclinicity is a necessar but not a sufficient condition, and that cyclogenesis results from an unbalance, in the lay below the level of non-divergence, of the vorticity advection and the Laplacian of certai thermal quantities, of which the temperature advection appears to be of primary importanc It is found, also, that the height and configuration of the level of non-divergence constitu modifying factors, while the vertical circulation, attendant to cyclogenesis, constitutes a brak on the development at sea level. It is suggested that cyclogenesis results, not from the releas of an infinitesimal perturbation by a dynamically unstable state but rather, from the releas

f some kind of instability by finite perturbations which can be identified with the wave-shaped notion patterns in the upper westerlies. *Subject Headings:* **1. Cyclogenesis 2. Instability.** —*Author's abstract.*

6.4–127 551.511

Priestley, C. H. B., **Convection from a large horizontal surface.** *Australian Journal of Physics*, 7(1):176–2021, March **1954.** 5 figs., 8 tables, refs., 36 eqs. **MH-BH**—A theory is ut forward for convection from a large horizontal heated surface in a semi-infinite medium, by uoyant elements which are subject to continuous mixing with the environment by turbulence n a smaller scale. It is assumed, with support from similarity arguments, that the (potential) emperature θ at sufficient height z above the surface obeys the form $-(g/\theta)(\partial\theta/\partial z) = C_z^{-\delta}$, where δ and C are positive constants. It is then shown: (i) that δ must in practice be close to /3 and equal to it under steady conditions, except in layers where radiational heating is large, where δ will be smaller; (ii) that the rate of heat loss varies as $C^{3/2}$; and (iii) that the r.m.s. emperature fluctuations are proportional to $C_z^{-1/3}$. Experimental results from the surface ayers of atmosphere support these predictions quite well. The principal results are first iggested for free convection by dimensional and similarity arguments. They receive in- ependent confirmation from the mechanistic theory, which extends into conditions when orced convection is present but not dominant. The theory also provides information about he multiplying constants in the above relationships, though it does not so far lead to a pre- iction of their exact values. The multiplying constants depend, *inter alia*, on the mass ratio etween the ascending and descending air, and this remains constant through the layer of onstant heat flux. The behaviour of the ascending elements and that of the descending air re shown to be quite differently governed. *Subject Heading:* **1. Convection theory.**—*Author's bstract.*

6.4–128 551.511:551.558

Priestley, C. H. B., **Buoyant motion in a turbulent environment.** *Australian Journal f Physics*, 6(3):279–290, Sept. **1953.** 3 figs., 13 refs., 20 eqs. **DWB**—Solutions are given of he simultaneous equations for the vertical velocity and temperature of an element of fluid noving under buoyancy and subject to continuous mixing of heat and momentum with its nvironment. Three distinct modes of behaviour result: (A) ascent followed by damped scillations, (B) asymptotic ascent to an equilibrium level, (C) *absolute buoyancy* in which the scent rate increases indefinitely. For an environment in which the lapse rate is subadiabatic he motion is of type *A* for sufficiently large elements but may become *B* for the smaller ele- ients; in superadiabatic lapse rates the mode is *C* for sufficiently large elements, and *B* for he smaller elements, which are in no way unstable. The *mode* of motion is independent of he initial conditions but the scale of the motion is not. The same formulation applies within nown limits to the ascent of saturated air, and applications made to atmospheric convection ıclude the verification of a formula for the period of large cloud tops oscillating in a stable ayer. *Subject Headings:* **1. Energy dispersion 2. Vertical currents.**—*Author's abstract.*

6.4–129 551.511

Queney, P., **Phénomènes de résonance et d'instabilité dans les écoulements barotropes, vec application aux ondes atmosphériques de grande échelle.** [Resonance and instability henomena in a barotropic flow with applications to large-scale atmospheric waves.] *Annales e Géophysique*, 9(3):185–226, July/Sept. **1953.** 18 figs., 100 eqs. English and Esperanto ummaries p. 185–186. **DWB**—The author theoretically examines the case of fluid flow in hich a linear velocity gradient and a gradient of eddy motion exist without one being directly ssociated with the other. He finds that in such a case the linear velocity gradient has an ttenuating effect on the perturbations and does not (as is widely believed) promote instability. rom a combination of two or more fluid flows with linear and eddy gradients the author erives the properties of (a) planetary waves in a single jet stream, (b) planetary waves in a ouble jet stream, (c) cyclonic waves in a single jet stream and (d) cyclonic waves in a multiple et stream. *Subject Headings:* **1. Physics of the atmosphere 2. Energy equations 3. Jet tream.**—*G.T.*

6.4–130 551.511:551.54

§Reed, Richard J. (*M.I.T.*), **A study of atmospheric vorticity.** Massachusetts Institut of Technology, Dept. of Meteorology, Contract N5ori-97804, Research on Atmospheri Pressure Changes, Technical Report, No. 10, Oct. 15, 1951. 19 p.+unpaged figs., 2 tables 7 refs., 4 eqs. **DWB**—An attempt to study pressure changes through vorticity. Vorticit is here defined as the vertical component of the relative vorticity. The orders of magnitud of the terms in the vorticity equation were determined for the various layers of the atmosphere for height 0 to 3 km the divergence and vertical shear are 10^{-9} to 10^{-8} sec^{-2}, and the latitudina displacement and solenoid effect 10^{-10} to 10^{-9} sec^{-2}. Present American pibal networks ar dense and reports accurate enough as a rule for most calculations. Actual vorticity chart are presented for synoptic situations in eastern U.S.A. and conclusion drawn that corre spondence between actual and geostrophic vorticities is close when well defined pressur patterns exist at 850 and 750 mb. *Subject Headings:* **1. Pressure changes 2. Vorticit calculations 3. Geostrophic winds.**—*M.R.*

6.4–131 551.511:551.515.4:551.509.

Sakuraba, S., **The mechanism of alteration of vertical lability of the atmosphere in summe and its application to heat-thunderstorm forecasting.** *Geophysical Magazine*, Tokyo, 24(2):81- 107, Nov. **1952.** 14 figs., 3 refs. **MH-BH**—The correlation between vertical instabilit and the occurrence of heat thunderstorms is investigated. It is found that vertical labil energy exceeding 2,000 joules is necessary for the formation of thunderstorms. Conditions o vertical instability are analyzed using aerological data obtained at Maebashi. Cooling alof is selected as the most effective factor leading to vertical instability. Basic principles o thunderstorm forecasting in Japan are outlined in terms of a combined evaluation of cold ai advection aloft and heating from below. *Subject Headings:* **1. Lability 2. Vertical tem perature gradient 3. Thunderstorm forecasting 4. Japan.**—*G.T.*

6.4–132 551.51

Sakuraba, S., **A note on the transformation of kinetic energy by large scale eddy stresses** *Geophysical Magazine*, Tokyo, 24(2):117-121, Nov. **1952.** 5 refs., 19 eqs. **MH-BH**—I connection with the dynamic theory developed by A. K. Blackadar (who treated large-scal atmospheric perturbations as eddies superimposed on the general circulation), the autho analyzes the process of energy transformation in the eddy motion and derives a formula fron which it appears that the magnitudes of eddy stress term and gravity-work term are ap proximately equal; a result very different from what could be derived from Blackadar' theory. The author concludes that if the planetary-wave theory of large-scale disturbance is to be maintained, this has to be done by taking into account the term of work against gravity which has not been done so far. *Subject Headings:* **1. Dynamics of the atmosphere 2. Vorticit equations.**—*G.T.*

6.4–133 551.51

Sakuraba, S. (*Central Met. Obs.*), **On the energetics of horizontal lability. (Pt. 1 & 2.** Pt. 1: *Geophysical Magazine*, Tokyo, 23(1):103–112, Dec. **1951.** fig., 3 refs., eqs. Pt. 2 *Ibid.*, 23(2):113–124, Jan. **1952.** 3 figs., tables, 3 refs., eqs. **MH-BH**—(1) An extension o Margules' theory of the energy of storms. Energy releasable from a dry adiabatic chang computed, assuming two air masses having an equal and constant lapse rate smaller than th dry adiabatic one. Results derived from an approximate integration of the energy equation While a small horizontal lability is surpressed by the stable stratification of the atmosphere cyclonic storms can be originated if the horizontal lability exceeds a certain critical valu (temperature difference about 8°C). (2) The energy releasable when a warm mass ascend wet-adiabatically and a cold mass descends dry-adiabatically is studied and numerical sample discussed. Large horizontal lability can be an energy source of storms. *Subject Heading* **1. Horizontal lability 2. Energy of storms.**—*A.A.*

6.4–134 551.51

Sakuraba, S., **On the energetics of vertical lability.** *Geophysical Magazine*, Toky 23(3):205–228, March **1952.** 6 figs., 8 tables, 8 refs., 44 equations. **DWB**—In the author

pinion the conventional method of computing the energy of vertical lability, which is based n the assumption that an isolated parcel of air could ascend or descent without causing any nange in the density of surrounding air masses (the parcel method of energy computation), isregards the effect of a large number of particles which fill up the space vacated by the moving r mass. This effect is incorporated into the slice method of energy computation. Through n elaborate series of energy equations and numerical computations the author applies the ice method to energy calculations in five different cases of vertical instability. *Subject eadings:* **1. Potential energy 2. Stability 3. Convection 4. Parcel method.**—*G.T.*

6.4–135 551.511

Sato, T. (*Met. Res. Inst., Tokyo*), **On the horizontal motion of the atmosphere, Pt. 1, tationary motion.** *Papers in Meteorology and Geophysics*, Tokyo, 2(3/4):343–345, Dec. **1951. t. II, Stationary motion in spherical coordinates,** and **Pt. III, Vorticity integral in the non-ationary motion.** *Ibid.*, 3(1):64–69, March **1952.** 6 refs., 19 eqs. **MH-BH**—The equations motion are integrated, disregarding vertical motion and friction and assuming that the uid is autobarotropic. The laws of conservation of absolute vorticity and of energy are erived in this way. *Subject Headings:* **1. Dynamic meteorology 2. Vorticity 3. Horizontal otion.**—*A.A.*

6.4–136 551.511

Sakuraba, S., **The relation between a closed energy system and an open energy system.** *eophysical Magazine*, Tokyo, 24(4):209–218, March **1953.** fig., 6 refs., 10 eqs. **MH-BH**— heoretically a closed energy system corresponds to a special case of an open energy system, hich, however, does not always mean that the latter system is more apt to explain the energy alance of atmospheric disturbances than the former. It is emphasized here that in some ases the energy mechanism of atmospheric phenomena can be expressed more adequately by closed system than by an open one. *Subject Headings:* **1. Energy equations 2. Dynamics the atmosphere.**—*Author's abstract.*

6.4–137 551.511:551.515

Sato, T., **On the structure of cold vortex.** *Papers in Meteorology and Geophysics*, Tokyo, (2):157–171, Aug. **1952.** 2 figs., 17 refs. **MH-BH**—Integrals accounting for the three-mensional structure of a cold vortex and representing the laws of conservation of angular omentum, of vorticity and of energy are derived for the case of frictionless axis-symmetrical, ationary state with the assumption of autobarotropic air. The vortex thus described is riefly compared with the circumpolar vortex, the typhoon and the anticyclone. *Subject eadings:* **1. Anticyclones 2. Dynamics of the atmosphere 3. Cold vortexes 4. Typhoons Vorticity equations.**—*G.T.*

6.4–138 551.511:532.5:378

Seeger, R. J. (*Naval Ordnance Lab., Silver Spring, Md.*), **On fluid dynamics in physics aching.** *American Journal of Physics*, 21(1):29–46, Jan. **1953.** 18 figs., 2 tables, 70 refs. **LC**—In the light of private answers suggested for the public questions: What is physics? Vhat is education?, a critical review is made of fluid dynamics in physics teaching. First, eneral physics is examined for what is being done in teaching fluid dynamics in physics. critical analysis is made in particular of the important Bernoulli theorem as to what it is, hat it says, what it means, and how it is used. Second, theoretical physics is examined for hat is being done. In this case, the motion of a sphere has been selected as illustrative of esent teaching. The typical course in theoretical physics is then examined with respect to s material about the motion of a sphere, both in a perfectly inviscid fluid and in a perfectly scous fluid. This academic material is compared finally with experimental observations, rticularly those in wind tunnels and in ballistics ranges. In conclusion, questions are noted the foundations of fluid dynamics, particularly the role of viscosity, turbulence, the concept a steady state, and the role of heat. The review ends with a moral question as to the udents' stake. *Subject Headings:* **1. Dynamics of the atmosphere 2. Fluid dynamics Teaching of meteorology.**—*Author's abstract.*

6.4–139 551.511:551.51

Stoker, J. J., **Dynamical theory for treating the motion of cold and warm fronts in t atmosphere.** New York Univ. Institute for Mathematics and Mechanics, Contract N6c 20101, [unnumbered report], June **1953.** p. 1–28. figs., eqs. Also: Whitham, G. **Dynamics of meteorological fronts.** *Ibid.*, p. 29–49. 7 figs., 8 refs., eqs. **DWB**—Theoreti discussion of dynamics of fronts, with illustrative schematic diagrams. *Subject Headin* **1. Dynamics of fronts 2. Frontal movements.**—*M.R.*

6.4–140 551.511:536.2:551.57

U. S. Snow, Ice and Permafrost Research Establishment, **Convective heat transfer cha** Its *SIPRE Data Sheet*, No. 1, [1954?] 2 p. chart, ref. **DWB**—Nomogram gives t convective heat transfer from snow, entering with wind speed and the temperature differen air minus snow. The nomogram is based on the turbulent transfer equation of H. Sverdru *Subject Headings:* **1. Convective heat transfer 2. Heat balance of snow 3. Turbulent e change.**—*A.A.*

6.4–141 551.511:551.5

Van Mieghem, Jacques, **Sur les équations du mouvement de l'atmosphère intégré suivant la verticale.** [The equations of motion in the atmosphere, integrated over the vertica *Belgium. Institut Royal Météorologique, Publications*, Ser. B, No. 3, **1952.** 23 p. 10 ref 48 eqs. English summary p. 3. **DWB**—Study deals with the vertically averaged motion large atmospheric disturbances, introducing an equation of balance for the mechanical a internal energy from which the energy fluxes and the rates of energy production and conversi are deduced. The main energy conversions occur between the potential energy and the kine energy of the thermal wind and between the latter and the kinetic energy of the vertica averaged motion. *Subject Headings:* **1. Dynamics of the atmosphere 2. Atmospheric circul tion 3. Energy conversions 4. Equations of motion.**—*A.A.*

6.4–142 551.5

Vernotte, Pierre, **La convection naturelle par la sphère peu chaude.** [Natural convecti through a moderately heated sphere.] *Académie des Sciences, Paris, Comptes Rendus*, 237 (2 1312–1314, Nov. 23, **1953.** **DWB**—The thermal effect of convection is theoretically express by accounting for (1) conductive exchange and (2) velocities introduced into the fluid (fi approximation). It is found that convection in an unlimited medium can best be calculat by first expressing it in respect to a globe with a finite radius and then increasing that radi indefinitely. *Subject Heading:* **1. Convection.**—*G.T.*

GENERAL CIRCULATION

See also: **Transport of energy in atmos.** (Kao), 6.4–8; **Atmos. circulation** (Van Mieghem), 6.4–141; **Anticyclone in horse latitude** (Sekine), 6.4–154.

6.4–143 551.513.1:551.5

Rogers, M. H., **A note on computed transports of angular momentum in a theoreti model of the general circulation.** *Royal Meteorological Society, Quarterly Journal*, 80 (346):62 628, Oct. **1954.** 3 refs. **DWB**—For a model with zonally uniform heating the N–S transpo of angular momentum is computed for latitudes 10–60°N, (1) by meridional cells; (2) horizontal exchange (eddy viscosity). *Subject Headings:* **1. Momentum transfer 2. Atmo pheric circulation.**—*C.E.P.B.*

6.4–144 551.513.2:551.5

Boogaard, H. M. v.d., **Jet stream between Pretoria and Maun.** *South Africa. Weath Bureau, News Letter*, No. 63:8, June 30, **1954.** table, diagr. **DWB**—The existence of a narro belt of fast mixing air north of Pretoria and south of Maun is confirmed by a Comet aircra operating at about 38,000 ft on the route between the aforementioned points, which report an airstream with a velocity of about 130 knots. A table gives the nearest available upp air observation for this occasion. An upper air chart showing a geostrophic wind of ov

100 knots normal to route Pretoria-Maun at 200 mb is presented. *Subject Headings:* **1. Jet stream 2. Pretoria-Maun air route 3. South Africa.**—*I.L.D.*

6.4–145 551.513.2:551.557:551.577.37

Means, Lynn L. (*U.S.W.B., Forecast Center, Chicago*), **A study of the mean southerly wind-maximum in low levels associated with a period of summer precipitation in the Middle West.** *American Meteorological Society, Bulletin*, 35(4):166–170, April **1954.** 3 figs., 8 refs. **MH-BH**—The synoptic conditions during the period July 10–12, 1951, when heavy flood-producing rains occurred in the Kaw (Kansas) River Basin in eastern Kansas, and at Kansas City, are analyzed and represented by means of an 850 mb chart and cross section from Albuquerque to Little Rock showing the low level southerly "jet" which carried moisture into the area at 2000–8000 ft levels. The southerly jet is associated with "pre-trough" conditions. *Subject Headings:* **1. Jet stream effects 2. Low level jet stream 3. Synoptic condition for heavy rainfall 4. Cross sections 5. Kansas City, Mo.**—*M.R.*

6.4–146 551.513.2

Mintz, Yale, **The observed planetary circulation of the atmosphere.** California. Univ. at L. A. Dept. of Meteorology, Contract AF(122)-48, Scientific Report, No. 3, Aug. **1953.** 10 p. 3 figs., 20 refs. **DWB**—All available sources of data, both from actual observations (pilot balloon and wind data) and derived data from high level pressure charts, were used to construct a composite picture of the zonal wind profile from pole to pole, from summer to winter and from sea level to 50 mb pressure surface. The sources are listed, charts are reproduced and analyzed in terms of seasonal circulation patterns in different latitude belts. A time-latitude diagram of the planetary circulation at 50 mb level is presented (for each month from 20° to 90° lat. and with isotachs drawn for every 2 m.p.sec.). *Subject Headings:* **1. General circulation 2. Zonal wind profiles.**—*M.R.*

6.4–147 551.513.2

Saucier, Walter J. (*Dept. of Oceanog., Texas, A. & M. College*), **Horizontal deformation in atmospheric motion.** *American Geophysical Union, Transactions*, 34(5):709–719, Oct. **1953.** 8 figs., table, 4 refs., 19 eqs. **MH-BH**—Linear properties of the field of motion and the resultant stretching and shearing deformation is discussed. The deformation can be measured by finite differences in the earth's coordinate grid, from kinematic directions or evaluated by a planimeter. The geostrophic deformation in idealized fields of motion is shown. As a sample a north-south current east of the Rocky Mountains diverging over the United States, is analyzed. *Subject Headings:* **1. Horizontal deformation 2. United States.**—*A.A.*

6.4–148 551.513.2:523.45

Shapiro, Ralph, **On the nature of Jovian spots as indicated by their distribution and velocities in 1928.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 24:115–122; *AFCRC Technical Report 53-35.* Nov. **1953.** 2 figs., table, 4 refs. **DWB, DLC**—Spot velocities have been computed from 378 latitude-longitude determinations for the 1928 opposition of Jupiter. The results of this study are described and a so-called synoptic map of spot velocities is constructed. Analogies are made between the Jovian equatorial acceleration and the terrestrial jet stream. It is proposed that the spots are associated with vortices in Jupiter's atmosphere. *Subject Headings:* **1. Jovian spot velocities 2. Jet stream analogies 3. Planetary atmospheres 4. Jupiter.**—*Author's abstract.*

6.4–149 551.513.2:551.515:551.43

Wilkins, Eugene M., **Relation between speed and latitudinal position of the belt of strongest westerlies and the location of troughs and ridges aloft.** Chicago. University. Dept. of Meteorology, Contract N6ori, Task Order 23, Report, Nov. **1949.** 7+ p. 9 figs., 7 refs. **DWB**—A study of the effect of mountain barriers on long-waves in the westerlies based on 5-day mean 700-mb charts for period Feb. 21, 1948 to Jan. 5, 1949 prepared by the Extended Forecast Section of the U. S. Weather Bureau. Since mountain barriers (such as the Rockies or Himalayas) vary in height, the absolute effect as well as the latitudinal effect on waves in the westerlies will vary. The Himalayas tend to divert the flow whereas the Rockies merely

alter the position of the troughs. *Subject Headings:* **1. Orographic effects 2. Waves in th westerlies 3. Extended forecasting. I. U. S. Weather Bureau. Extended Forecast Sectio** —*M.R.*

6.4–150 551.513.

Winston, Jay S. (*U. S. W. B., Wash., D. C.*), **The weather and circulation of Novembe 1953. A month of contrasting regimes.** *Monthly Weather Review*, 81(11):368–373, Nov. 195 5 figs., 8 refs. **MH-BH**—During the 1st half of Nov. only one storm affected the U. S. an that center moved up to New England off the East Coast from the Gulf. In the last half Nov. cyclonic activity was quite strong—9 storms occurring within the limits of continenta U. S. as shown on two cyclone trajectory charts. Mean temperatures were very high over th Northern States throughout the month, but precipitation was quite variable—subnormal th first two weeks and above normal (except in S.W.) the last two weeks. Circulation feature causing these anomalies are discussed and illustrated. *Subject Headings:* **1. Monthly circulatio patterns 2. Weather anomalies 3. United States.**—*M.R.*

ATMOSPHERIC DISTURBANCES

See also: **Radar in hurricane tracking** (Jorgensen), 6.4–79; **Essay on development** (Petterssen), 6.4–126; **Vertical lability** (Sakuraba), 6.4–131; **Cold vortex** (Sato), 6.4–137; **Dynamics of fronts** (Stoker), 6.4–139; **Westerlies; troughs and ridges aloft** (Wilkins), 6.4–149; **Weather extremes in Fla.** (Day), 6.4–194; **Typhoon rainfall** (Kanaya), 6.4–294.

6.4–151 551.515.7:551.55

§Kamiko, T., **The warm high over Japan proper.** *Journal of Meteorological Researc* Tokyo, 5(3):179–183, March **1953.** 16 figs. In Japanese; English summary p. 179. **MH BH**—The author investigated the warm type anticyclones passing over Japan proper, on th basis of data for 1950 and 1951. He found that (1) there are two types of anticyclones, on having an axis inclined to the west, the other to the east; (2) a warm high appears after high-level cyclone or a typhoon has passed; (3) in the above case the zone of prevailing weste lies is very different from normal; (4) it is impossible to determine the existence of a war high from data on upper air winds alone. *Subject Headings:* **1. Synoptic studies 2. Anti cyclones 3. Japan.**—*Author's abstract.*

6.4–152 551.515.7:551.577.31(5)

Kawazoi, N., **The "Baiu" high pressure in 1951.** *Journal of Meteorological Researc* Tokyo, 4(5):208–215, Aug. **1952.** 9 figs., 4 refs. In Japanese; English summary p. (15 **MH-BH**—"Baiu" weather situation from the end of June to the middle of July 1951 is in vestigated. During this period the surface high, which is considered to be the cause of "Baiu, stays over the Okhotsk Sea, and is intensified by warm upper blocking high. The formatio of blocking high is similar to that of Rossby-Bolin's model, and it appears first over the Aleutia Islands. This blocking action is discussed. *Subject Headings:* **1. Bai-u 2. Blocking actio 3. Anticyclones 4. Japan.**—*Author's abstract.*

6.4–153 551.515.7(52):551.524:551.577.3

Sakai, H., **On the relation between path of travelling anticyclone in spring and air tem perature or rainfall amount in summer in Tohoku District.** *Journal of Meteorological Researc* Tokyo, 4(10):751–755, Feb. **1953.** 6 figs. In Japanese; English summary p. 47–48. **MH BH**—The position of the frontal zone between the Ogasawara anticyclone and the polar a mass is plotted daily for July 1934 and 1935. These positions govern the distribution rainfall in the two months. The position of the frontal zone in summer is related to th tracks of travelling anticyclones in spring; hence the latter give an indication of summe temperature and rainfall in the Tohoku District. *Subject Headings:* **1. Anticyclone movemer 2. Air temperatures 3. Rainfall amount 4. Tohoku District, Japan.**—*C.E.P.B.*

6.4–154 551.515.7(52):551.513.

Sekine, Y., **On the upper air anticyclone of horse latitudes in the neighbourhood of Japa (1st paper).** *Society for the Long-Range Forecast of Tohôku District, Journal*, 11(2):20–2

Nov. **1951.** 5 figs., 2 tables, 10 refs. In Japanese; English summary (reprinted and laid in) p. 250. **DWB**—The author investigates the mean upper air anticyclonic belt in horse latitudes and its effect on the weather in Japan by using the monthly mean contours (680 mm and 530 mm surfaces) for the period 1907–1942. The nine-year periodicity of meridional oscillation of the high-pressure belt in horse latitudes which appears distinctly on the earth's surface becomes less distinct with height. It might be concluded that the nine-year periodicity may be caused by northern air masses. *Subject Headings:* **1. Anticyclones 2. Meridional circulation 3. Japan.**—*From author's abstract.*

6.4–155 551.515.7(492):551.589.5

§van der Ham, C. J. and Kuipers, W. J. A., **Karakteristieke weertypen IV. Oostcirculatie: hogedruck boven Scandinavië.** [Characteristic weather types, IV, Easterly circulation: high pressure over Scandinavia.] *Hemel en Dampkring*, 48(12):211–213, Dec. **1950.** 6 figs. **DLC**—The easterly circulation weather type is the result of a high pressure area over Scandinavia and of a low pressure area over the Mediterranean; the pressure gradient declines from north to south. When these weather types are stable an upper high is formed southwest of the center of the Scandinavian high and an upper low or "cold well" is formed above the Mediterranean low. These act as steering centers for depressions originating in the Atlantic Ocean influencing the weather of western and central Europe. Generally the "high" effect is predominant. Four specific examples of this easterly circulation weather type which occurred in the Netherlands in 1929, 1947 and 1950 are described in detail and illustrated with synoptic charts. *Subject Headings:* **1. Anticyclones 2. Synoptic climatology 3. Netherlands.**—*I.L.D.*

6.4–156 551.515.71(5):551.511

Ando, T., **Energy of anticyclone.** *Papers in Meteorology and Geophysics*, Tokyo, 2(3/4): 268–274, Dec. **1951.** 5 tables, 2 refs. **MH-BH**—The author calculated the energies of the Siberia, Okhotsk and Ogasawara anticyclones, which are considered to be the action centers in the environment of Japan. Computing the energy transformation he found that the potential energy will decrease by descending motion and about 43% of its decrement convert into kinetic energy. *Subject Headings:* **1. Anticyclones 2. Energy transformation 3. East Asia.**—*A.A.*

6.4–157 551.515.71(5):551.43 551.515.11:551.43

Suzuki, Seitaro (*Training School of Met. Observers, Tokyo*), **On the orographic influence on atmospheric pressures and currents. (IV).** *Geophysical Magazine*, Tokyo, 23(4):349–358, May **1952.** 7 figs., 5 refs., 19 eqs. **MH-BH**—Ekman considered that an air mass rotating about its vertical axis, when it rises above the surface of the earth, acquires an anticyclonic motion in the Northern Hemisphere known as the Ekman current; on descending it acquires a cyclonic motion. The Ekman function is integrated to determine the velocity of air currents under conditions of a mountain shaped like a cylinder with a flat top, deformation of air currents by a mountain range with a rectangular profile, and the crossing of air currents over a mountain range. Also the influence of topography on the isobaric pattern of approaching atmospheric highs and lows is analyzed mathematically. Both the Ekman effect and the static theory explain the isobaric bulging of the great high pressure zone on the Asiatic Continent, which embraces the coastal line of Japan, and the appearance of the high over Japan proper. The splitting of a cyclone is explained better by the lifting of the air mass by the action of the mountain or the static theory. *Subject Headings:* **1. Anticyclogenesis 2. Cyclone theories 3. Ekman effect 4. Orographic effects 5. Asia.**—*I.L.D.*

6.4–158 551.515.711(262)

Rosenthal, Stanley L. and Gleeson, Thomas A., **The temporal and geographic distribution of sea level anticyclogenesis affecting Mediterranean weather.** Florida. State Univ. Dept. of Meteorology, Contract AF 19(122)-466, Scientific Report, No. 5, Aug. 15, **1953.** 7 p. 24 figs., 4 tables, 7 refs., eqs. **DWB**—This paper is a report on an initial study of sea-level anticyclogenesis in the Mediterranean region. The problem is attacked statistically. The distributions of anticyclogenesis with time and space are obtained and illustrated with a

series of maps and graphs. A definite seasonal variation of anticyclogenetic activity is found over the Mediterranean Sea, with maximum activity in the warm season. Problems which have arisen and which are suitable topics for future research are noted throughout the text. Methods for improving the results are outlined. A statistical method is proposed by which the intensifications of pre-existing anticyclones may be studied. The results of a trial computation using this method are presented. *Subject Headings:* **1. Anticyclogenesis 2. Mediterranean Region.**—*Authors' abstract.*

6.4–159 551.515.72:519.241.8(265/6)

Kobanawa, I., **On the North Pacific high in August.** *Journal of Meteorological Research*, Tokyo, 3(14/15): 486–492, Dec. **1951.** 4 figs., 4 eqs. In Japanese; English summary, p. (31). **MH-BH**—The periodicity of minimum temperature at 5 stations in Japan is investigated by means of a graph representing frequency distribution of mean temperature in August during the years 1915–1949. Years with maximum and minimum sunspot numbers are indicated. Variation in sea level pressure in Aug. at 7 stations from 1907 to 1942 is graphically represented. Paths of cyclones in Aug. 1937 and 1941 and frequency distribution of anticyclones in Aug. 1935 and 1937 are shown on charts. *Subject Headings:* **1. Anticyclones 2. Frequency distributions 3. Cyclone tracks 4. Sunspots 5. North Pacific Ocean.**—*G.T.*

6.4–160 551.515.72(261)

van der Ham, C. J., **Hogedruk tussen Ijsland en Norwegen.** [High-pressure between Iceland and Norway.] *Hemel en Dampkring*, 50(5):88–89, **1952.** 2 figs. **MH-BH**—A synoptic analysis of the atmospheric pressure distribution between March 27 and March 30, 1952, over northwestern Europe and the northern Atlantic over Iceland, associated with the record cold wave. *Subject Headings:* **1. Synoptic studies 2. Cold waves 3. North Atlantic Ocean.**—*I.L.D.*

6.4–161 551.515.72:551.589.1(492)

van der Ham, C. J., **Luchtdrukverdeling en weertypen tijdens de droge en zonnige Octobermaand 1951.** [Atmospheric pressure distribution and weather types during the dry and summy October 1951.] *Hemel en Dampkring*, 50(1):15–16, **1952. MAB**—A synoptic analysis of the weather indicates that during the month Holland was under the influence of a continental high pressure area and easterly winds prevailed. *Subject Headings:* **1. Synoptic studies 2. Pressure distribution 3. Weather types 4. Netherlands.**—*I.L.D.*

6.4–162 551.515.72(7

Wasko, Peter E. (*Dept. of Met., Univ. of Chicago*), **Pressure and temperature variations over the centers of typical migratory anticyclones.** *American Meteorological Society, Bulletin*, 35(1):26–32, Jan. **1954.** 10 figs., 14 refs. **MH-BH**—From twenty years of Jan. and Feb. North American trajectories of migratory anticyclones, four typical groups were found. Examples of these types were studied with respect to the temporal variations of the pressure and temperature at standard levels in a vertical column of the atmosphere over the center of the migratory anticyclones. Certain characteristic features of these variations are summarized. *Subject Headings:* **1. Anticyclones 2. Pressure variations 3. Temperature variations 4. North America.**—*Author's abstract.*

6.4–163 551.515.73:551.515.8:551.555.9(263

§Chase, Joseph, **The Bermuda-Azores high pressure cell; its surface wind circulation.** Woods Hole Oceanographic Institution, Contract N6onr-27701 (NR-083-004), Technical Report, No. 20, July **1951.** 12 p. 24 figs. (mostly charts), refs. **DWB**—The average location and shape of the extensive high are briefly discussed and the clockwise circulation of surface winds described. Anomalies of location, shape, and circulation (associated with fronts, stagnant lows, linkage, uniting, replacement and hurricanes) are commented upon and illustrated with maps from the period 1899–1939. *Subject Headings:* **1. Bermuda—Azores High 2. Anticyclone surface wind circulation 3. Anticyclone structure 4. Anticyclone movement**—*M.P.K.*

6.4–164 551.515.73(265)

Nagamitsu, E., **South and north oscillation of middle latitude high.** *Journal of Meteorological Research*, 3(9):325–326, July **1951.** fig. In Japanese. **DWB**—Chart shows oscillatory movement of anticyclone center between 30° and 40°N, and 40 and 50°N between Sept. and June. *Subject Headings:* **1. Subtropical anticyclones 2. Pacific anticyclones 3. Air mass movements.**—*M.R.*

6.4–165 551.515.8(439.1)

Aujeszky, László, **Frontátvonulási jegyzék Budapestről 1952. április 1–június 30-ig.** [Calendar of frontal passages, Budapest, April 1–June 30, 1952.] *Időjárás*, 56(5/6):174–176, May/June **1952. DWB**—The two tables included in this calendar are regular features of the journal. The first table gives a daily list of the passage of fronts over Budapest with specification of date and hour, quality of front (cold or warm), its strength (weak, moderate, strong), and synoptic phenomena connected with it. Table two is a daily record of air masses with indication of their origin, time of appearance and disappearance and nature of boundary front. *Subject Headings:* **1. Frontal movements 2. Air masses 3. Budapest, Hungary.**—*G.T.*

6.4–166 551.515.8(425)

Barnes, F. A., **Microfronts.** *Weather*, 7(11):353–354, Nov. **1952. MH-BH**—Note on a microfront which passed across North Midlands July 1, 1952, with squall winds possibly from an incipient tornado. *Subject Headings:* **1. Fronts 2. Midlands, England.**—*C.E.P.B.*

6.4–167 551.515.8(424)

Beaver, S. H., **Ten fronts in one week—and their graphical expression.** *Weather*, 8(2):37–39, Feb. **1953.** fig. **MH-BH**—Autographic records for Keele, Staffordshire, Oct. 27–Nov. 2, 1952, showing passage of warm and cold fronts in unstable Mp air. *Subject Headings:* **1. Fronts 2. Staffordshire, England.**—*C.E.P.B.*

6.4–168 551.515.8(497.1)

Čadež, Marjan O., **Pregled prodora hladnog vazduha u FNRJ u 1951 godini.** [Cold air invasions in Yugoslavia, 1951.] *Belgrade. Aerološka Opservatorija, Godišnjak*, p. 57–68, **1951.** In Croatian and French. 79 charts. **DWB**—Charts representing all cold-air invasions identified over Yugoslavia in 1951 are presented. Each chart shows the development of one of 179 cold-air invasions by means of isochrones of the beginning of an invasion, or of boundary lines between air masses, fixed at indicated time intervals. Brief comments on the direction of the invasion and on accompanying pressure development are added to each chart. Typical features of cold-air invasions in Yugoslavia are summed up. *Subject Headings:* **1. Cold air invasions 2. Yugoslavia.**—*G.T.*

6.4–169 551.515.8(263)

Franceschini, Guy A., **Modifications in tropical air crossing the Gulf of Mexico toward the United States.** Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-169, Scientific Report, No. 3, April **1954.** 12 p. 9 figs., table, 5 refs. **DWB**—Changes occurring in the lower levels of maritime tropical air moving across the Gulf of Mexico are measured. Computations are based on radiosonde observations made at the termini of selected trajectories. Each trajectory is discussed. It appears that the modifications can be explained qualitatively in terms of surface water temperature distribution and horizontal mass divergence of the air. *Subject Headings:* **1. Air mass modification 2. Maritime air masses 3. Air trajectories 4. Gulf of Mexico.**—*Author's abstract.*

6.4–170 551.515.8:551.509.3(521.2)

§Isozaki, I., **Strong southwest wind in the south of Kanto District.** *Journal of Meteorological Research*, Tokyo, 5(3):125–134, March **1953.** 10 figs., 2 eqs. In Japanese; English summary p. 125. **MH-BH**—Frequently in the south Kanto District a strong southwesterly wind suddenly begins to blow, accompanying the passage of a warm front. As an example, the author analyzes a warm front accompanied by a cyclone on Jan. 30, 1950, by means of

pressure charts and pressure, temperature and wind velocity records. *Subject Headings:* **1. Synoptic studies of warm fronts 2. Kanto District, Japan.**—*From author's abstract.*

6.4–171 551.515.8:616

Kutschera, W., **Statistische Überlegungen zur Frage einer Frontenabhängigkeit des Herzinfarktes.** [Statistical considerations on the problem of the dependence of heart infarction upon fronts.] *Wetter und Leben*, 5(8/10):149–152, Nov. **1953. MH-BH**—One hundred and thirty-four cases of myocardial infarction occurring over a period of 700 days in which 211 were characterized by fronts were analyzed statistically in order to determine the relationship between fronts and heart infarction. The classification of fronts into five groups depending upon intensity (used by the Bioclimatology Section of the Central Institute of Meteorology and Geodynamics in Vienna) was used. Fronts of the "O" type, the lowest degree of intensity, are shown to lack a biotropic effect. A further analysis of the variation of the incidence of heart infarction with different degrees of frontal intensity fails to reveal a clear dependence of myocardial infarction upon fronts. *Subject Headings:* **1. Frontal effects on heart infarction 2. Medical meteorology.**—*I.L.D.*

6.4–172 551.515.8:001

Lacy, Ralf Edwin, **Microfronts or local fronts?** *Weather*, 7(12):386, Dec. **1952. MH-BH**—Argues that "microfront" is a misnomer; "local front" may be better. *Subject Headings:* **1. Fronts 2. Nomenclature.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Ozone molecule** (Darling), 6.4–120.

6.4–173 551.521(43)

*Busse, W. (*St. Blasien*), **Strahlugsintensitäten im Südschwarzwald.** [Radiation intensity in the South Black Forest.] *Germany. Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Wissenschaftliche Arbeiten*, 1:16–23, **1947.** 10 tables, 9 figs., 6 refs. **DLC**—Contains radiation data of all types and comparative curves showing conditions related to other Central European stations. *Subject Headings:* **1. Radiation data 2. Radiation intensities 3. Black Forest, Germany.**—*M.R.*

6.4–174 551.521:551.507.362

*Denver. University. Department of Physics, **Daylight luminescence and infrared absorption.** Contract W19-122 ac-16, Final Report [1952]. 34 p. table, 21 plates, refs., additional publications, p. 33–34. **DWB**—A summary of 16 reports (from July 1, 1948 through April 30, 1952) with brief notes on the period from April 30 through May 31, 1952. Daylight luminescence was measured with spectrographic equipment carried by balloons to 53,000 and about 100,000 ft, respectively. Features of the equipment are presented in photographs. Observational data on: 1) atmospheric water vapor determination by means of infrared spectroscopy, 2) spectro-solar intensity in the infrared, 3) color temperature of the sun and 4) solar energy at earth's surface are presented in diagram and discussed. F. E. Fowle's method of determination of precipitable water from infrared spectrum is verified in general and its reliability discussed. *Subject Headings:* **1. Daylight luminescence 2. Infrared absorption 3. Precipitable water vapor 4. Rocket instrumentation.**—*W.N.*

6.4–175 551.521:551.571

Savinov, S. I., **O priblizhennom opredelenii koeffitsientov prozrachnosti.** [Approximate determination of the transparency coefficient.] (In: Leningrad. Agrogidrometeorologicheskiĭ Institut, **Materialy po agroklimaticheskomu raĭonirovaniiu subtropikov SSSR.** [Materials on the agro-climatic classification of the subtropics in the U.S.S.R.] Leningrad, Gidrometizdat, 2:13–14, **1938.** 2 tables.) **DLC**—The method of Kimball, published in the *Monthly Weather Review*, Oct. 1928, has been used for computation of the transparency coeffi-

cient by various conditions of absolute humidity. These data are compared with those obtained by KALITIN from actinometric observations in Slutsk. The differences did not exceed 4 units, but it is noticed that in the localities with greater atmospheric pollution they might be somewhat greater. *Subject Headings:* **1. Actinometry 2. Radiation 3. Humidity effects 4. Transparency coefficient.**—*N.A.S.*

6.4–176 551.521 551.584

Smirnov, V. A., **K voprosu o radiatsionnom rezhime sklonov.** [On the problem of the radiation regime of slopes.] (In: Leningrad. Agrogidrometeorologicheskiĭ Institut, **Materialy po agroclimaticheskomu raĭonirovaniiu subtropikov SSSR.** [Materials on the agro-climatic classification of the subtropics in the U.S.S.R.] Leningrad, Gidrometizdat., 2:45–50, **1938.** 3 figs., 3 tables.) **DLC**—This investigation takes up the following elements of the radiation regime: 1) scattered radiation, 2) long wave radiation of the atmosphere received by slopes and 3) nocturnal outgoing long wave radiation of the slopes. The observations were taken in the Batum botanic garden on the slopes of Mount "Frida" in Sept.–Oct. 1935 and in March–April 1936. All details of installations and observations are given. The tables show: 1) actually observed values of scattered radiation on the northern and southern slopes, 2) intensity of long wave radiation of the atmosphere on both slopes with 45° and 90° inclination of the instrument and on a horizontal surface and 3) nocturnal outgoing long wave radiation from both slopes. Specific conclusions concerning the effects of various causes on differences in the radiation regime of the slopes complete the article. *Subject Headings:* **1. Radiation regime 2. Scattering of light 3. Outgoing radiation 4. Microclimatology 5. Batum, Caucasus.**—*N.A.S.*

6.4–177 551.521.1:621.47

Dickinson, Thomas A., **Convair's new solar furnace.** *Ceramics Age*, Sec. I, 64(2):24–25, Aug. **1954.** photos. **DLC.** Also: **Solar furnace develops 8500 F.** *Heating and Ventilating*, N. Y., 51(8):80, Aug. **1954.** photos. **DWB**—The basic part of the solar furnace described and illustrated in these articles is a 120-inch polished aluminum mirror which collects solar rays in an image having a diameter of $\frac{5}{16}$ of an inch. The furnace is being used by Convair's San Diego division for research on various materials. *Subject Heading:* **1. Solar furnaces.**—*G.T.*

6.4–178 551.521.1:551.588.2

Gordov, A. N., **Raschet priamoĭ solnechnoĭ radiatsii na razlichno orientirovannye nakonnye poverkhnosti dlia shiroty 42°.** [Computation of direct solar radiation on differently oriented slopes at 42° latitude.] .(In: Leningrad. Agrometeorologicheskiĭ Institut, **Materialy po agroklimaticheskomu raĭonirovaniiu subtropikov SSSR.** [Materials on the agro-climatic classification of the subtropics in the U.S.S.R.] Leningrad, Gidrometizdat, 2:27–44, **1938.** 7 tables, 13 eqs.) **DLC**—The effect of slope aspect on the amount of direct solar radiation received is investigated. The problem is discussed theoretically and formulas are derived for computing the amounts of direct solar radiation received by slopes of different orientation, for any place and for any day of the year. The tables give the height of sun at latitude 42° for the moment with declination of sun as 23°, 18°, 13°, 8°, 4°, 0°, −4°, −8°, −13°, −18° and −23°; the azimuths of sun before and after noon; the amounts of possible direct solar radiation received by slopes of different orientation at latitude 42° and the daily totals of possible direct solar radiation on different slopes at 42° latitude for the last day of each decade. *Subject Headings:* **1. Solar radiation 2. Tropographic effects 3. Microclimatology 4. Subtropic zone, U.S.S.R.**—*N.A.S.*

6.4–179 551.521.11(54)

***Lal, S. S., Sunshine at Rangoon.** *India. Meteorological Dept. Scientific Notes*, 9(103): 29–32, **1946.** 2 tables. **DWB**—The data of the duration of bright sunshine, recorded at the Rangoon Port Observatory from January 1931 to December 1940 have been discussed. Tables showing the monthly and annual totals of bright sunshine for the above period, and monthly and annual means (in hours per month and per day) for the decade 1931–1940 have been given and some useful conclusions have been drawn from these tables. *Subject Headings:* **1. Sunshine duration data 2. Rangoon, India.**—*Author's abstract.*

6.4–180 551.521.11:551.506.9:551.584

Trojer, Hans, **Distribución horizontal de luminosidad en un cafetal y en almácigos.** [Horizontal distribution of light in coffee groves and nurseries.] *Centro Nacional de Investigaciones de Café, Chinchiná, Colombia, Biblioteca, Boletín Informativo*, 4(45):20–32, Sept. **1953.** 3 tables, graphs, diagrs., 7 refs. **MH-BH**—The proper amount of shade is vital to the development of coffee plants. The author presents and discusses data on the amount of direct and reflected light received with various degrees of cloud cover in open fields and on plantations shaded by platanus, guamo or mimosa trees. *Subject Headings:* **1. Insolation 2. Illumination measurements 3. Micrometeorological data 4. Coffee plantations.**—*G.T.*

6.4–181 551.521.16:551.524:581.13

Ferres, Helen M., **Influence of light and temperature on nutrient uptake and use, with particular reference to zinc.** (In: Specialist Conference on Plant and Animal Nutrition in Relation to Soil and Climatic Factors, Australia, 1949, **Proceedings,** pub. **1951.** p. 240–243. 10 refs.) **DWB**—Experimental studies carried out in California and Australia on the dependence of zinc utilization by maize and tomatoes upon temperature are reviewed and it is shown that zinc deficiency of plants in spring is not caused by low soil temperature but instead by light duration. After reviewing experimental data on the seasonal variations in zinc utilization under field conditions and its utilization under greenhouse conditions, it is concluded that zinc uptake depends upon air temperature and length of light period. *Subject Headings:* **1. Plant assimilation 2. Daylight illumination 3. Temperature effects.**—*I.L.D.*

6.4–182 551.521.16:634

Haas, A. R. C., **Effect of length of day on the growth of orange trees.** *California Citrograph*, 36(10):395, 416, Aug. **1951.** 5 refs. **DA**—No literature reference has been found to studies on photoperiodism effects on citrus fruits. The experiments reported herein were designed to test the effect of half and of almost complete lath coverings on the amount and quality of fruit vs. plant growth and the effect of artificially lengthening the day. The fruit and its quality was much decreased and the foliage increased by the greater amount of lath covering. The experiments were carried on from Nov. 1949 to June 1951 in Riverside, Calif. Longer "daylight" improved size and appearance of trees. Harmful effects of days shortened by smog or clouds in Southern California are considered possible. *Subject Headings:* **1. Photoperiodism 2. Light intensity 3. Citrus fruits 4. Southern California.**—*M.R.*

6.4–183 551.521.3:523.77

*Benesch, William; Strong, John and Benedict, W. S., **Solar spectrum from 3.3 to 4.2 microns.** Johns Hopkins Univ., Contract N5ori-16605, Progress Report (unnumbered), Aug. 1, **1950.** 10 p. 4 tables, 5 figs., 12 refs. **DWB**—A prism-grating spectrograph with a cooled lead telluride detector has been used to map the region of the solar spectrum beyond 3.3μ at high resolution. In addition to bringing about a general improvement in many of the prominent features of the spectrum, such as greater detail in the Q-branch of HDO, this work has brought out several new aspects of the atmospheric absorption. A group of regularly spaced methane lines has been found mixed with the R-branch of HDO, the rotation structure of the 3.91μ band of N_2O has been completely resolved, and a strong Brackett line of solar hydrogen has been observed. Rotational assignments have been made for practically all the lines of H_2O in the region, and for most of the stronger lines of HDO. *Subject Headings:* **1. Atmospheric absorption 2. Solar spectrum.**—*Authors' abstract.*

6.4–184 551.521.3:535.34

*Benesch, William; Elder, Tait and Strong, John, **Absorption spectrum of the lower atmosphere from 2.5- to 4.0 microns.** Johns Hopkins Univ., Contract N5ori-16605, Progress Report [unnumbered], Sept. 15, **1950.** 5 p.+16 figs., 3 refs. **DWB**—The work reported here is an extension of the studies of solar radiation with high dispersion. The transmission of the ground layer of the atmosphere has been investigated over path lengths of 112 and 876 feet in the region 2.5μ to 4.0μ, with a high dispersion prism-grating spectrograph and cooled lead telluride detector. The short path records show only water vapor, while those from the longer path show clearly both CH_4 and HDO absorption. Absorption due to

N_2O, previously reported in the solar spectrum, was not detected here. *Subject Headings:* . **Absorption spectra 2. Solar radiation.**—*Authors' abstract.*

6.4–185 551.521.3:551.521.61:546.264

Cloud, William H., **The 15 micron band of CO_2 broadened by nitrogen and helium.** ohns Hopkins University, Contract Nonr-248(01), Progress Report, Jan. 1, **1952.** 19 p. 7 figs., 9 refs. **DWB**—Elaborate presentation of results of measurements in the 15μ CO_2 and made by the author with infrared equipment at Johns Hopkins Univ. The observations vere made with a 100 foot Pfund-type cell, using a low pressure carbon arc attachment as a ght source. Methods of measurement and computation are described, the theory of band bsorption developed, and the effect of He and N_2 on broadening of the CO_2 band shown (He s not as important as N_2). Only bulk effects of average transmission for an entire band or ride spectral region could be deduced. For pressures from 20 to 640 mm Hg average aborption for wings of CO_2 15μ band is proportional to fourth root of total pressure for constant ptical thickness of CO_4. *Subject Headings:* **1. Carbon dioxide spectroscopy 2. Infrared bsorption 3. Pressure broadening of spectral lines.**—*M.R.*

6.4–186 551.521.3:551.521.63

Curtis, J. P., **Absorption coefficients of air and nitrogen for the extreme ultraviolet.** *Physical Review*, 94(4):908–910, May 15, **1954.** 2 figs., table, 4 refs. **DWB**—A method involving the use of two photomultiplier tubes as detectors has been developed for absorption tudies in the extreme ultraviolet. The monochromator was a modified grazing-incidence pectrograph. A capillary discharge tube was employed as a source. Absorption coefficients or dry air and nitrogen were measured in the range 150A–1000A. The total oscillator strength f nitrogen for the transitions appropriate for this range was computed to be 3.2. *Subject Headings:* **1. Absorption coefficients 2. Ultraviolet absorption.**—*Author's abstract.*

6.4–187 551.521.3:533.12

Jarmain, W. R. and Nicholls, R. W., **Transition probabilities of molecular band systems. I, The computation of vibrational transition probabilities for diatomic molecules.** London, ntario. Univ. of Western Ontario. Dept. of Physics, Contract AF 19(122)-470, Scientific eport, No. 4, Dec. 5, **1952.** 17 p. 3 tables, 7 refs., 34 eqs. **DWB**—This report describes he analytical procedure adopted in preliminary computations of vibrational transition probbilities for diatomic molecules. Such probabilities are obtained from overlap integrals of the ave functions for the states between which transition occurs. The form of complete normalzed vibrational wave functions in terms of generalised Leguerre Functions of fractional order nd integral degree is presented. Certain useful recursion relations enabling high quantum umber wave functions to be calculated from lower quantum wave functions are derived. ransition probabilities computed by the methods of this paper for the transitions $N_2C^3\pi \rightarrow B^3\pi$, $_2B^3\pi \rightarrow A^3\Sigma$ are presented. *Subject Heading:* **1. Transmission coefficients.**—*Authors' bstract.*

6.4–188 551.521.3:551.521.63

Johannin-Gilles, Andrée and Vodar, Boris (*both of Laboratoire de Physique-Enseignement, orbonne, Paris*), **Sur le spectre d'absorption de la vapeur d'eau dans l'ultraviolet de Schumann.** The absorption spectrum of water vapor in the Schumann ultraviolet.] *Journal de Physique le Radium*, Paris, 15(3):223–224, March **1954.** 2 figs., 11 refs. **DLC**—Problems connected ith the measurement, identification and explanation of absorption spectra in the Schumann . V. (around 1700 Å), the lowest band for water vapor, are discussed and curves presented n the basis of the authors' measurements with a quartz spectrograph at temperatures from ° to 900°C and λ1600–2100 Å. The most likely dissociation mechanism is $H_2O \rightarrow OH+H$. xperiments are being made in the 200–1200 Å region by the authors and collaborators, sing a tangent grating spectrograph. *Subject Headings:* **1. Ultraviolet absorption spectra Water vapor absorption spectra 3. Dissociation and recombination of water 4. Quartz pectrographs.**—*M.R.*

6.4–189 551.521.3

†Linke, Franz (*Frankfurt a. Main*), **Die kurzwellige Himmelsstrahlung.** [Short wave sky diation.] *Handbuch der Geophysik*, Berlin, 8:339–431, **1942.** figs., tables, refs., bibliog.

p. 428–431. **DWB**—In this chapter (Ch. 7) the author has organized and summarized knowledge of short wave sky radiation (diffuse) in great detail. Theoretical calculations for various solar angles and wave lengths, actual calorimetric observation by various authors in different parts of the world (e.g. ABBOT and FOWLE, 1905), light intensity or density of a cloudless sky, sky radiation in various spectral areas, circum solar light intensity, blueness of sky, effect of clouds, albedo of clouds and earth, snow, ice, etc., and, finally, civil twilight in various latitudes and seasons are presented or analyzed with numerous tables and nomograms. *Subject Headings:* **1. Short wave sky radiation 2. Albedo 3. Sky radiation.**—*M.R.*

6.4–190 551.521.3:535.34

Plass, G. N.; Curtis, A. R. and Goody, R. M., **Spectral line shape and its effect on atmospheric transmissions.** *Royal Meteorological Society, Quarterly Journal*, 80(345):452–455, July 1954. 12 refs. **DWB**—PLASS replies to criticisms of his work (**Pressure broadening of absorption lines,** *Physical Review*, N. Y., 2nd Ser., 86(1):138–139, April **1952,** *see* 3.10–150, Oct. 1952, *MAB* and **Influence of line shift and assymetry of spectral lines on atmospheric heat-transfer,** *Journal of Meteorology*, 9(5):333–339, Oct. **1952,** *see* 4.2–139, Feb. 1953, *MAB*) by CURTIS and GOODY in *Ibid.*, 80(343):58–67, Jan. 1954. CURTIS and GOODY comment. *Subject Heading:* **1. Absorption spectra.**—*C.E.P.B.*

6.4–191 551.521.3:551.571

Porter, Elizabeth M., **Mean amounts of precipitable water in New Zealand region.** *New Zealand. Meteorological Office, Circular Note*, No. 70, March 14, **1951.** 3 p. 3 tables, graphs, 4 refs. **DWB**—The monthly mean precipitable water has been calculated (by the formula of S. SOLOT) for all the months for 1950, but for 5 years mean alternate months were calculated, and the latter are given in tables. Also graphs showing the monthly variation of total depth of precipitable water (surface = 500 mb) and curves showing the relation between total moisture in a column of the atmosphere to the moisture measured at the surface are presented. *Subject Headings:* **1. Precipitable water 2. New Zealand.**—*I.L.D.*

6.4–192 551.521.3

Utah. Univ. Meteorology Dept., **Study of the influence of radiational heat exchange on thermodynamic processes in the atmosphere.** Contract AF 19(122)-256, Progress Reports, No. 1, 3, 4, 6, and 10, June 15–Sept. 15, 1950; Dec. 15, 1950–March 15, 1951; March 16–June 15, 1951; Sept. 15–Dec. 15, 1951; Sept. 16–Dec. 15, **1952.** 5 pieces. tables, refs. On cover page of some pieces: **Atmosphere Radiation Research Project. DWB**—The scope of the project is to "study the influence of radiational heat exchange on thermodynamic processes in the atmosphere with emphasis on synoptic applications." The main effort was devoted to the application of standard business machines, computing the cooling rate due to water vapor radiation. A scientific paper, by HOFFER, on radiational cooling in certain typical air masses is given in Report No. 3, where data are presented for different locations in the Northern Hemisphere. The cooling is practically independent of assumed stratospheric humidity. *Subject Headings:* **1. Radiational cooling 2. Absorption by water vapor.**—*A.A.*

AIR TEMPERATURE

See also: **Radio-sonde ascents** (Taylor), 6.4–77; **Frontiers of atmosphere** (Ley), 6.4–115; **Probe air . . .** , 6.4–118; **Anticyclone movement** (Sakai), 6.4–153; **Light and Temp. influence on plants** (Ferres), 6.4–181; **Abnormal temp. effects** (Hallenbeck), 6.4–224; **Vertical motion and advection** (Fleagle), 6.4–247; **Weather and circulation . . .** (Klein), 6.4–287; **Met. research** (Akedo), 6.4–315; **Humidity-fixing effect** (Kitamura), 6.4–316; **Use of short observ.** (Sapozhnikova), 6.4–330; **Observing of star scintillation,** 6.4–334.

6.4–193 551.524.36

Centkiewicz, Czesław, **O najzimniejszych miescach powierzchni ziemi.** [On the coldest points of the earth's surface.] *Gazeta Obserwatora PIHM*, Warsaw, 4(10):4–6, Oct. **1951. DLC**—Popular article explaining that the coldest points on earth are not the geographical poles as would be expected, but such places as Verkhoiansk (East Siberia) with a minimum

temperature of 65°C below zero, 261 freezing days per year; Oĭmekon (650 km to the southeast of Verkhoiansk) with a 67°C below zero minimum temperature and Eismitte (Greenland). After some brief information on climatic conditions prevailing in these places, the author deals with the vast areas which are eternally frozen and with the possibilities of their utilization. *Subject Headings:* **1. Extreme temperatures 2. Verkhoiansk, U.S.S.R. 3. Oĭmekon, U.S.S.R. 4. Eismitte, Greenland.**—*A.M.P.*

6.4–194 551.524.36 551.515.2(759)

§Day, Richard Lovèy (*Univ. of Florida*), **Weather extremes in Florida during 1950–1951.** *Florida Academy of Science, Quarterly Journal*, 16(2):102–109, June **1953.** 2 plates (fold.), 4 refs. Abstracted from reprint. **DWB**—Jan. 1950 was second warmest (+9°F) and driest (av. 0.39″) Jan. on record. June also had record heat and drought. Three fully developed hurricanes entered Florida in 1950. The Cedar Key storm of Sept. 5–6 brought one of the heaviest rains ever recorded in the U. S.; 24.50″ or more in a little over 24 hours. The Oct. 18 hurricane at Miami was accompanied by gusts of 150 mph and rainfall of 15″ (Titusville, Fla.). On Nov. 25–26, 1950 record low temperature for Nov. of 16°F occurred at Secotan at the time of the great snowstorm of New York City. Then on Feb. 3 and 4, 1951, another record cold wave brought 10°F to Crestview in NW Florida (the record was −7°F at Tallahassee in Feb. 1899). Two inches of snow fell at St. Augustine—heaviest in Florida since 1899. Charts show isobars and mean isotherms for above events. *Subject Headings:* **1. Cold waves 2. Hurricanes 3. Florida.**—*M.R.*

6.4–195 551.524.36

Lagarmilla, Roberto (*Uruguay, Servicio Meteorologico*), **El pasado verano fué intenso y uniforme.** [The past summer was very hot and uniform.] *Revista Meteorológica*, Montevideo, 11(41):235–240, Apr. **1952.** 2 figs. **DWB**—Data on temperature and humidity for Montevideo (Prado) are presented for the summer 1951–52 and compared with corresponding values for 1950–51. The author comments on the temperature, precipitation and thunderstorms during the unusually warm and prolonged summer of 1951–52. *Subject Headings:* **1. Hot summers 2. Temperature data 3. Humidity data 4. Montevideo, Uruguay.**—*G.T.*

6.4–196 551.524.36

Lembke, H., **Die mittleren absoluten Maximaltemperaturen in Europa und den Mittelmeerländern.** [The average absolute maximum temperatures in Europe and the Mediterranean regions.] *Erdkunde*, Bonn, 1(4/6):184–189, **1947.** map in pocket, foot-refs. **DLC**—A map in the scale 1:20,000,000 shows the distribution of highest temperatures reached on the average within the year. The values are not reduced to a common level. There is a sharp gradient near the coasts. Weather situations leading to extreme temperatures are discussed. *Subject Headings:* **1. Maximum temperatures 2. Temperature charts 3. Europe 4. Mediterranean regions.**—*A.A.*

6.4–197 551.524.36(988,99)

Loewe, F., **The lowest temperatures recorded in Antarctica and Greenland.** *Polar Record*, 7(48):231, July 1954. 3 refs. **DLC**—Quotes −61°C and possibly −64°C measured by R. E. Byrd at Bolling Base (80°8′S, 163°55′W), July 21, 22, 1934 and −66°C at French Greenland station (70°54′N, 40°42′W, 2993m) on Feb. 21, 1950. *Subject Headings:* **1. Minimum temperatures 2. Antarctica 3. Greenland.**—*C.E.P.B.*

6.4–198 551.524.36

Rudloff, H. (*St. Blasien*), **Winterstrenge und Sommerwärme in Südwestdesutschland.** [Severe winters and hot summers in southwest Germany.] *Baden. Landeswetterdienst, Jahresbericht mit Abhandlungen*, p. 169–172, **1951/1952.** 4 tables, 3 refs. **DWB**—Cumulative temperatures for days with means under the freezing point and over 20°C, observed in each winter and summer of the period 1869–1952, are given for Karlsruhe. It is shown that this method characterizes each season better than usual means. *Subject Headings:* **1. Accumulated temperatures 2. Extreme temperatures 3. Karlsruhe, Germany.**—*A.A.*

6.4–199 551.524.36:551.577.38(44)

*Sanson, J., **Chaleur et sécheresse ont constitúe les dominantes de l'été météorologique 1952.** [Heat and drought: the ruling factors of the 1952 summer season.] *La Météorologie*, Paris, 4th Ser., No. 29:43–49, Jan./March 1953. French, English and Spanish summaries p. 43. **MH-BH**—Details of the weather in France during April–Aug. 1952 are given in tables and analyzed. The general tendency was toward an extremely hot and dry season which is said to occur in 18 or 6-year periods (dates of extremes since 1712 given). Characteristics of hot dry years since 1876 are also given. *Subject Headings:* **1. Drought 2. Hot summers 3. France.**—*M.R.*

6.4–200 551.524.36

Scott, Hugh, **Cold Kane is hot theme. Some towns in State are more frigid but not consistently.** *Philadelphia Inquirer Magazine, Today*, Dec. 27, 1953, p. 9. map. **DWB**—A map of Pennsylvania shows the portion of that state near Kane which rightly has the reputation of being the coldest in the state, both in Jan. and August. About half of the record temperatures in the past 10 years have occurred in this area (−31°F in Jan. and 26°F in Aug. are extremes). The altitude (2000 ft) and distance from large bodies of water (Lake Erie) are given as the reason for the anomaly. Occasionally some other part of the state is colder, but not so consistently. *Subject Headings:* **1. Extreme temperatures 2. Kane, Penn.**—*M.R.*

6.4–201 551.524.36

Tajima, S.; Sato, Y.; Fujiwara, H. and Sekine, Y., **On the very hot weather at Fukushima in summer.** *Journal of Meteorological Research*, Tokyo, 4(10):793–802, Feb. 1953. 13 figs., 4 refs. In Japanese; English summary p. 49. **MH-BH**—The basin of Fukushima (36°N 138°E) in central Japan has maximum temperatures >37°C in fine weather with light winds in July. The high temperatures are not due to descent of air warmed by forced ascent and condensation on windward side of mountains, but to accumulation of heated air in the basin, favored by high upper air potential temperature. The stronger the monsoon the more readily this warm air is removed so that temperature rises with decrease of wind speed. The highest temperatures occur with the approach of the anticyclone from the south. *Subject Headings:* **1. Hot summers 2. Fukushima, Japan.**—*C.E.P.B.*

6.4–202 551.524.36

Zách, Alfréd, **Milyen meleg és milyen hideg lehet a tél Magyarországon?** [How warm and how cold can winter become in Hungary?] *Természet és Technika*, Budapest, 112(1):57–58, Jan. 1953. 4 charts. **DLC**—In addition to figures and charts on recorded average and extreme winter temperatures, the author quotes several historic accounts of severe and mild winters in Hungary. These accounts date back to the 14th century (an isolated report of unusual cold is available for 557 A.D.). Considering the period Dec. 1–Feb. 28 as meteorological winter and using more than 170 years of records available at the Hungarian Meteorological Institute, mean winter temperature in Hungary is determined as follows: *minimum:* −5°C, *average:* −1 to +1°C, *maximum:* +3.5°C. *Subject Headings:* **1. Winter temperatures 2. Extreme temperatures 3. Severe winters 4. Hungary.**—*G.T.*

6.4–203 551.524.36

Zách, Alfréd, **111 évvel ezelőtt volt a mostanihoz hasonló rendkivül meleg április.** [An unusually hot April last equaled 111 years ago.] *Természet és Technika*, Budapest, 111(6):375, June 1952. **DLC**—Unusual temperature conditions in Hungary during April 1952 are described. In Budapest the mean temperature of the month was 15.1°C (4.1 above normal). The heat wave set in with practically no transition period after rather cold weather at the beginning of April. The author believes that the small number of sunspots may be responsible for the rare phenomenon. *Subject Headings:* **1. Early summers 2. Heat waves 3. Hungary.**—*G.T.*

6.4–204 551.524.36(439.1)

Zách, Alfréd, **Szélsőségesen meleg napok 1953 októberében.** [Extremely hot days in October 1953.] *Időjárás*, 57(6):381–382, Nov./Dec. 1953. table. **MH-BH**—Oct. 16, 17,

8 and 19, 1953 had the highest temperature on record for those dates (records started in 1871). The record temperatures measured in Budapest are listed along with the earlier highest temperatures. The synoptic situation which led to this unusual heat wave is described. The highest temperature in Budapest was taken on Oct. 18 (27.1°C, 4.3°C above the earlier record of 1943); at Pécs (southern Hungary) 30°C was measured on the same day. *Subject Headings:* **. Extreme temperatures 2. Hungary.**—*G.T.*

6.4–205 551.524.36:628.8

Thom Herbert C. S. (*U.S.W.B.*), **Normal degree-days below any base.** Paper presented at the Baltimore meeting of the American Meteorological Society, April 30, 1954. Wash., D. C., Weather Bureau, **1954.** 7 p. tables, 2 refs. Mimeo. Also in: *Monthly Weather Review*, 82(5):111–115, May **1954.** fig., table, 7 eqs., 2 refs. **DWB**—Heating engineers sometimes have need for normal degree-days for bases other than 65°F. Further analysis of relationship between mean temperature and mean degree-days for base 65°F showed that the form of this relationship is independent of the base. This makes it possible to vary the base of any value and hence to compute degree-day normals for any base from normal temperature. Results are presented for selected stations for bases ranging from 35° to 70°F. *Subject Headings:* **1. Degree-day normals 2. Degree-day data.**—*Author's abstract.*

6.4–206 551.524.36:697

*Penrod, Estel Burdell; Gard, C. D.; Jones, H. E., et al., **Earth heat pump research, Pts. I, II and III.** *Kentucky. University. Engineering Experiment Station, Bulletin*, 4(14), Dec. **1949;** 5(18), Dec. **1950;** 7(1), Sept. **1952.** 3 pieces. 64+104+87 p. tables, figs., refs., eqs. **DWB**—In the first report, the earth heat pump system is described and an analysis of heating and cooling tests of short duration is given. The second report deals with the performance of an earth heat pump operating intermittently on the heating cycle from Nov. 1, 1949 to May 1, 1950. The third gives an account of the performance of an earth heat pump operating intermittently on the cooling cycle from July 1, 1950 to Oct. 1, 1950. The installation consists chiefly of a 3-hp Marvair package heat pump, an instrument panel, and a ground coil buried in the earth. *Subject Heading:* **1. Heat pumps. I. Collier, H. E. II. Patey, R. N. III. Knight, R. B. IV. Baker, Merl V. Thornton, Raymond Charles.**—*From authors' introduction.*

6.4–207 551.524.36:697

Rozenfel'd, L. M., **Termodinamicheskie tsikly dinamicheskogo otopleniia s ispol'zovaniem raznosti temperatur kholodnogo vremeni goda.** [Thermodynamic cycles of dynamic heating with utilization of the difference in temperatures during the cold season.] *Akademiia Nauk SSSR, Doklady*, 82(3):393–396, Jan. 21, **1952.** 3 figs., 3 refs., 5 eqs. **MH-BH**—This study was conducted in the Leningrad Institute of Refrigeration and Milk Industry. The author presents a series of thermodynamic equations and schemes of ammonia-water heating where the outdoor cold air in the winter season has been used for water vapor condensation in the heating system. *Subject Headings:* **1. Heat pumps 2. U.S.S.R.**—*N.T.Z.*

6.4–208 551.524.37:551.583.15(485)

*Liljequist, Gösta H., **The severity of the winters at Stockholm.** *Geografiska Annaler*, 25(1/2):81–104, **1943.** 7 figs., 11 tables, refs. **DLC**—Using data for Stockholm, the author constructed diagrams based on three methods of determining severity of a winter: 1) mean temperature of Dec.–March, T_1; 2) mean temperature of the three coldest months, T_2 and 3) sum of negative monthly mean temperature $\Sigma T_{neg.}$ The severity of the winters for the whole period (1575–1942) according to the three methods is shown in a table. Conclusions regarding the winter temperature of Stockholm are: 1) mean temperature decrease of 2°C from about 1760 up to decade 1931–1940, 2) decrease in number of severe winters with number of mild winters remaining constant in recent years and 3) for the period 1861–1940 the length of the winter has remained unchanged but the number of cold days has decreased. Three severe winters, 1940, 1941 and 1942 ended the remarkable change in winter climate. *Subject Headings:* **1. Severe winters 2. Climatic variations 3. Stockholm, Sweden.**—*M.L.R.*

6.4–209 551.524.37:551.311.18

Liljequist, Gösta H., **Isvintern 1946–47.** [The winter 1946–47.] *Sweden. Meteorologisk och Hydrologiska Institut, Meddelanden, Ser. B*, No. 5, **1947.** 18 p. 5 figs., symbols, 2 tables 6 refs. English summary p. 17–18. **MH-BH**—Summarizes air temperatures and ice conditions Nov. 1946–March 1947 in Swedish waters and closing and opening of ports. Winter was cold but not severe. *Subject Headings:* **1. Sea ice 2. Sweden.**—*C.E.P.B.*

6.4–210 551.524.3

*Szilágyi, Tibor, **Az 1952. évi rendkívüli májusi fagyok.** [The unusual freezing temperatures of May 1952.] *Időjárás*, 58(1):15 23, Jan./Feb. **1954.** 6 figs. Russian and French summaries p. 15. [**Errata**], *Ibid.*, 58(2):127, March/April **1954. MH-BH**—Minimum temperatures during the period May 18–26, 1952 are listed for selected stations throughout Hungary. They reveal an unusually severe frost situation affecting the whole country. The study includes a discussion of frost frequencies at 5 Hungarian stations and a chart of average dates of last freezing temperature throughout Hungary. The May 1952 situation is compared with four earlier frost situations (deviations from 30-year pentad means, April 1–May 30) and found to be the most severe of the five cases. *Subject Headings:* **1. Spring frost 2. Hungary.**—*G.T.*

5.4–211 551.524.3

Zách, Alfréd, **Néhány szó az idei májusi fagyokról.** [Comments on the freezing weather of last May.] *Természet és Technika*, Budapest, 111(7):445, July **1952. DLC**—Late frost caused by cold-air invasions are not unusual in Hungary. The author describes the development of record cold throughout the country in May 1952, with temperatures as low as −7°C on May 21. *Subject Headings:* **1. Late frosts 2. Cold waves 3. Hungary.**—*G.T.*

6.4–212 551.524.3

Zawadil, Rudolf, **Die Fröste in Wien.** [Frosts in Vienna.] *Wetter und Leben*, 5(11/12) 203–208, Dec. **1953.** 2 figs., 4 tables. **MH-BH**—All "frost days" with daily minimum temperatures below 0°C and all "ice days" with daily maxima below 0°C for Vienna for the period 1876–1950 have been counted and analyzed statistically. Table giving 75-year mean and extreme number of frost and ice days for all months and quintile limit values of frost and ice days for each month for the period 1876–1950 are presented. The relationship between frost days in spring, summer and fall, climatic variations in the frequency of frost days as analyzed by means of 30-year running averages, the central tendency of the frost period Sept.–May and the relationship between mean monthly temperature and frost frequency are discussed. *Subject Headings:* **1. Frost 2. Frost frequencies 3. Statistical analysis 4. Long period records 5. Vienna, Austria.**—*I.L.D.*

6.4–213 551.524.37(436,497.1)

Zawadil, Rudolf, **Der Winter 1953/54 in Wien—Hohe Warte.** [Winter of 1953/54 in Vienna Hohe Warte.] *Wetter und Leben*, 6(1/2):25, March **1954.** Also his: **Der Winter 1953/54 in Ljubliana.** [Winter 1953/54 in Ljubljana.] *Ibid.*, p. 26. **DWB**—Mean monthly winter temperatures for 1953/54 and mean winter temperalities of the coldest winters during the past 179 years are given. *Subject Headings:* **1. Winter temperatures 2. Severe winters 3. Vienna, Austria 4. Ljubljana, Yugoslavia.**—*I.L.D.*

6.4–214 551.524.4:551.578.71

Gabilly, A., **Sur la variation annuelle du gradient vertical de température comparée avec celle de la frêquence de la grêle.** [Annual variation of the vertical temperature gradient compared with the variation in hail frequency.] *La Météorologie*, Paris, Ser. 4, No. 31:203–211, July/Sept. **1953.** 8 figs., 8 refs. In French; French, English and Italian summaries p. 203. **MH-BH**—Evidence indicating that the atmosphere below 1500 m influences the frequency of occurrence of hail in the summer by initiating the fusion of hailstones; in the spring it favors through its instability the formation of hail. *Subject Headings:* **1. Vertical temperature gradient 2. Hail frequencies 3. Hail formation.**—*I.L.D.*

6.4–215 551.524.7:551.596.1

Crary, A. P., **Revision of high-level wind and temperature measurements in Bermuda.** *Journal of Meteorology*, 11(3):257, June 1954. fig., table, 2 refs. **MH-BH**—Revision of calculations in 1950 (*see item* 8–146, Aug. 1950, *MAB*). *Subject Headings:* **1. Anomalous sound propagation 2. Upper air temperatures 3. Bermuda.**—*C.E.P.B.*

6.4–216 551.524.7:551.557.2:551.596.1

*Kennedy, William B.; Brogan, Lee; Sible, Norman J. and Brown, Raymond A., **Atmospheric winds and temperature to 55-kilometers altitude over Southwestern New Mexico as determined by acoustical propagation studies 0600–1020 MST 22 October 1952.** Denver. Univ. Denver Research Institute, Contract AF 19(122)-252, Scientific Report, No. 2, 1953. 57 p. numerous figs., tables, eqs. **DWB**—In order to determine accurately high-altitude temperatures over Almogordo, New Mexico, the acoustical propagation method developed by A. P. CRARY (*see* 4F–92, June 1952, *MAB*) was used to measure high altitudes winds and temperatures. Calculation of winds and temperature were carried out by means of CRARY's method for determination of two-gradient velocity height profile and the Brogan-Kennedy hyperbolic cosine velocity-height model. Results obtained by these methods were consistent. The determination of the average upper winds by the azimuth shift methods gave results which agreed in both wind direction and wind speed with these for the least square solutions. The theoretical bases of the methods of CRARY and BROGAN-KENNEDY, the methods of calculation and data are presented. *Subject Headings:* **1. Acoustical propagation 2. Upper air temperatures 3. Upper air winds 4. Southwestern New Mexico.**—*I.L.D.*

SOIL TEMPERATURE

6.4–217 551.525.2:550.36

Homma, S., **Some problems on the thermo-elastic deformations of the earth's crust.** *Geophysical Magazine*, Tokyo, 23(2):125–144, Jan. 1952. 7 figs., 4 tables, eqs. **MH-BH**—An elaborate theoretical paper discussing on a two dimensional basis the changes in the elastic strain within the earth's crust due to diurnal or annual variations of surface temperature. The first chapter discusses the effect on inclination and elongation in a tunnel; the second chapter analyzes the effect of temperature variations on a coast or on an island surrounded by an ocean with constant ground temperature. The stresses, of course, are found to be so negligible that a suspected connection with earthquakes is doubtful. *Subject Headings:* **1. Surface temperature variations 2. Thermodynamics of the earth.**—*A.A.*

6.4–218 551.525.4

Golubova, T. A., **Primer rascheta temperaturprovodnosti pochvy.** [An example of computation of thermal conductivity of the soil.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Trudy Nauchno-issledovatel'skikh Uchrezhdeniĭ, Ser. 1, Meteorologiia*, No. 39, p. 27–31, 1947. 2 figs., eqs. **DLC**—The author suggested a formula based on observations of the propagation of a thermal impulse received from the atmosphere into the soil. *Subject Headings:* **1. Soil temperatures 2. Thermal conductivity.**—*N.T.Z.*

WATER TEMPERATURE

6.4–219 551.526.6(931):551.464

Hefford, A. E., **Oceanography of the New Zealand seas.** *Royal Society of New Zealand, Transactions*, 77(5):212–221, Nov. 1949. table. **DLC**—Includes dynamical hydrology, surface salinities and temperatures and biology. *Subject Headings:* **1. Sea temperatures 2. Salinity 3. New Zealand seas.**—*C.E.P.B.*

6.4–220 551.526.6(261):551.311.17

Rodewald, Martin, **Eisgefahr im Nordatlantik.** [Ice danger in the North Atlantic.] *Wetterlotse*, No. 75:181–183, Sept. 1954. fig. **DWB**—Severe ice conditions south of usual limit in spring 1954 were associated with delayed rise of sea temperature. Chart of departure from the normal rise March–May 1954 given. *Subject Headings:* **1. Icebergs 2. Sea temperatures 3. North Atlantic.**—*C.E.P.B.*

6.4–221 551.526.8:551.311.182:627.8

Löfquist, Bertil (*Chief, Structural Res. Div., State Power Board, Sweden*), **Ice pressure against dams: studies of the effects of temperature variations.** *American Society of Civil Engineers, Proceedings*, v. 78, Separate No. 160, Dec. **1952.** 12 p. 8 figs., foot refs. **DWB**—Pressure by a solid sheet of ice as a result of rapidly rising temperatures studied by means of experiments under laboratory conditions, which show considerable disagreement with previous theories. Probable relation between maximum ice pressure and ice thickness given, considering the buckling effect. Ice pressure due to water level variations briefly discussed. *Subject Headings:* **1. Ice pressure 2. Meteorological engineering 3. Temperature effects.**—*A.A.*

6.4–222 551.526.8:628.113.1:551.579

Monfore, G. E. and Taylor, Frank W., **The problem of an expanding ice sheet.** *Western Snow Conference, 1948, Proceedings*, p. 30–45. pub. Feb. **1949.** 11 figs., 8 refs., 8 eqs. **DWB**—A good technical paper on the temperature and pressure effects caused by various factors (meteorological and other) as determined in laboratory and field tests in the Eleven Mile Canyon Reservoir (in the Denver region) made by the Bureau of Reclamation and others. Data are shown graphically and the mathematical calculations given *in extenso*. The purpose of the study is to determine the strength of dams necessary to withstand ice pressure, but conclusions are applicable to other fields. *Subject Headings:* **1. Ice pressure 2. Ice temperatures 3. River ice 4. Dams 5. Eleven Mile Canyon Reservoir, Colorado.**—*M.R.*

PRESSURE AND WIND

PRESSURE

See also: **Fluid theory for higher atmos.** (Yerg), 6.4–122; **Thermal advection** (Béll), 6.4–123; **Atmos. vorticity** (Reed), 6.4–130; **Abnormal temp. effects** (Hallenbeck), 6.4–224; **Shipwrecks** (Yoshizawa), 6.4–245.

6.4–223 551.541

Hoddinott, M. H. O.; Ashmore, S. E.; Candy, S. H. et al. **Barograph antics.** *Weather*, 7(9):291, Sept. **1952;** 7(10):320–321, Oct. **1952;** and 7(11):354, Nov. **1952. MH-BH**—Report of a sudden jump of barographs in the Chester area on July 6, 1952, from 1020–1023 mb and back to 1020 mb. *Subject Heading:* **1. Pressure jump. I. Williamson, H. II. Cuthbert, C. III. Reynolds, G.**—*C.E.P.B.*

6.4–224 551.542:551.547.2:551.524.6

Hallenbeck, Cleve (*Roswell, New Mexico*), **The influence of abnormal temperature conditions on the sea-level pressure reductions.** [1916] 9 p.+charts+copies of correspondence. Photostat. **DWB**—Unpublished paper, written in 1916, received by the Library of the Weather Bureau in 1952. The author shows that sea level pressure charts are often misleading in the mountain regions of the United States due to abnormal surface temperatures, introducing varying errors in the sea-level pressure reductions he suggests the use of maps of departure from the normal pressure. The problem of weather maps in mountain regions is solved much better now by the 700 mb maps, but the study of daily departure maps would be important from other viewpoints. *Subject Headings:* **1. Mountain regions 2. Barometer reduction 3. Departure maps 4. Abnormal temperature effects. I. U. S. Weather Bureau.**—*A.A.*

6.4–225 551.543:551.579.4:547.31

Tunzaad, H., **Brongas en barometerstand.** [Methane and height of the barometer.] *Hemel en Dampkring*, 50(1):6–8, **1952.** 3 figs. **DLC**—The observed relationship between methane production in wells and weather is not a direct effect of atmospheric pressure. An increase in atmospheric pressure upon ground water would lead to increased flow of water and of methane. It is shown experimentally that the increase in absolute pressure of ground water due to a rise in atmospheric pressure varies with the compressibility and porosity of the ground layers. Moreover, changes in ground water pressure, and hence variations in methane production, are influenced by flood conditions, river levels and piling up of water by wind

action. *Subject Headings:* **1. Pressure variations 2. Ground water variations 3. Methane production.**—*I.L.D.*

6.4–226 551.543.1

*New York University. College of Engineering. Research Div., **Atmospheric oscillations,** Contract AF 19(122)-49, Project No. 122, Progress Report No. 9, July 14, **1951.** 42 p. 6 figs., 1 tables, refs., eqs. **DWB**—An attempt is being made to determine the proportion of the diurnal pressure wave that is due to heating and to gravitational (tidal) effects, respectively. Observations made at New York Univ. (New York) were analyzed harmonically to determine seasonal heating effects on pressure wave (semidiurnal and diurnal). Time of diurnal maximum occurs earlier on clear than on cloudy days, both summer and winter, but the time of the semidiurnal maximum occurs later. This is apparently in contradiction to CHAPMAN's theory. These analyses will be made from hourly punched cards for 11 other stations in the United States, and the seasonal diurnal pressure wave further analyzed for a 10-year period for 100 stations in the United States, for which average hourly pressures are available. Data for 21 of these stations are presented *in extenso*. Further proof of connection between magnetically quiet days and upper air pressures was obtained. Tidal winds in the stratosphere and origin of trade wind cumulus are also being studied. *Subject Headings:* **1. Diurnal pressure waves. I. Haurwitz, Bernhard.**—*M.R.*

6.4–227 551.543.1:525.6:016

†New York University. College of Engineering. Research Div., **Atmospheric oscillations.** Contract AF 19(122)-49, Project No. 122, Progress Report No. 10, Oct. 14, 1951. 19 p. figs., refs., eqs. Appendix: Chiu, Wan-cheng, **Bibliography on atmospheric tides.** p. 13–19. **DWB**—Maximum semidiurnal pressure oscillation occurs at different times over different parts of the United States, due to topographic influences. Seasonal variation of time of this maximum does not favor CHAPMAN's theory concerning effect of thermal component of this oscillation. Advantages of statistical method of "factorial design" for study of relation between sun's variations and pressure changes discussed. Graphical representation of periodic wind system found in lowest 30 km of atmosphere. (*See item* 3.5–211, May 1952, *MAB.*) *Subject Headings:* **1. Atmospheric oscillations 2. Semidiurnal atmospheric tides 3. Atmospheric tides bibliographies. I. Haurwitz, Bernhard.**—*M.R.*

6.4–228 551.543.3:517.512.2

Stumpff, K., **Über die Zufallwahrscheinlichkeit von Periodizitäten in Beobachtungsreihen, Grundlagen einer allgemeinen Expektanztheorie.** [Fortuitous probability of periodicities in series of observations. Basis of a general theory of expectancy.] *Berlin. Universität. Meteorologisches Institut, Veröffentlichungen,* 1(2), **1936.** 54 p. 6 figs., 4 tables, 2 refs., 8 eqs. **DLC**—Schuster's criterion is only applicable to reality of periodicities in series of observations in which successive values are assumed independent. The case of autocorrelation is dealt with in this paper on the assumptions that distribution follows the Gaussian law of errors and all regression equations between series of successive values are linear. A general expectancy formula is found involving both the primary scatter of the observations and the autocorrelations with different lags; Schuster's criterion is a limiting case. The formula is applied to results of harmonic analysis of a series of pressure values at Berlin. *Subject Headings:* **1. Periodogram analysis 2. Pressure variations 3. Berlin.**—*C.E.P.B.*

TURBULENCE

See also: **Parameters of turbulent flow** (Hewson), 6.4–61; **Atmos. turbulence** (Ishida, others), 6.4–62; **Meas. of turbulence** (Quienne), 6.4–64; **Turbulent diffusion** (Ogura), 6.4–125; **Bermuda-Azores High** (Chase), 6.4–163; **Water consumpt. of crops** (Preobrazhenskii), 6.4–255.

6.4–229 551.551:629.13

*Bunker, Andrew F., **WHOI airplane turbulence and flux measurements, O'Neill, Nebraska, Aug. 21–28, 1953.** Woods Hole Oceanographic Institution Contract N6onr-27702,

Project NR-082-021, Technical Report, No. 29, April **1954.** 14 p. 9 figs., 2 tables, eqs. **DWB**—Data are presented in tables and graphs (0–2200 m) for 56 horizontal runs made from 40 ft to 7000 ft above ground. Equipment for measuring shearing stress, turbulent velocities and heat fluxes was mounted in a PBY aircraft. Flight procedures, instrumentation theory and calculation of data are treated. *Subject Headings:* **1. Turbulence measurements in flight 2. Shearing stress data 3. Turbulent exchange measurements 4. O'Neill, Nebraska.**—*M.R.*

6.4–230 551.551:629.13

Coleman, Thomas L. and Schumacher, Paul W. J. (*NACA. Aeronautical Lab., Langley Field, Va.*), **An analysis of normal-acceleration and airspeed data from a four-engine type of transport airplane in commercial operation on an eastern United States route from November 1947 to February 1950.** *U. S. National Advisory Committee on Aeronautics, Technical Note,* No. 2965, Aug. **1953.** 27 p. 5 tables, diagrs. **DWB**—Normal acceleration and airspeed data covering about 50,000 hours of flight of one type of four-engine transport airplane flown in commercial operations at altitudes to 20,000 ft on a north-south route in the eastern United States are analyzed to determine the gusts encountered and the accelerations experienced. Comparisons are made between the present results and the results previously obtained from other operations. Effects of airspeed and of seasons on the gusts and accelerations are indicated. *Subject Headings:* **1. Gust loads 2. Gusts 3. Aeronautical meteorology 4. United States.**—*NACA abstract.*

6.4–231 551.551:629.13

Coleman, Thomas L. and Copp, Martin R. (*NACA. Aeronautical Lab., Langley Field, Va.*), **Maneuver accelerations experienced by five types of commercial transport airplanes during routine operations.** *U. S. NACA, Technical Note,* No. 3086, April **1954.** 26 p. 5 diagrs., 3 tables. **DWB**—The magnitude and frequency of occurrence of maneuver accelerations experienced by five types of commercial transport airplanes during routine operations obtained from time-history (VGH) records are presented. The results are compared with available gust-acceleration data for the operations considered. *Subject Headings:* **1. Airplane performance 2. Gusts.**—*NACA abstract.*

6.4–232 551.551:533

Lauer, Otto, **Laminare und turbulente stationäre Strömung von Luft und Kohlensäure in einem schwach konischen Rohr in der Nähe der kritischen Reynolds'schen Zahl.** [Laminar and turbulent stationary currents of air and CO_2 in a slightly conical tube near the critical Reynolds number.] *Zeitschrift für angewandte Physik,* 5(3):81–90, **1953.** 22 figs., 4 refs., 7 eqs. **DLC**—Flow was investigated experimentally in a conical tube, diameter 1 to ½ cm in 5 m. Undisturbed convergent flow was laminar even above Re_{cr}(2450) but with increasing velocity the whole flow became turbulent and remained so while speed was above Re_{cr}. Any disturbance caused turbulence at Re_{cr}. Undisturbed divergent flow remained laminar while $Re < 4500$. Disturbed divergent flow passed gradually from turbulent to laminar between Re_{cr} and 1650. The results agree with calculations of W. Meissner and G. U. Schubert. *Subject Heading:* **1. Turbulence theory.**—*C.E.P.B.*

6.4–233 551.551:551.578.4

Lawrence, E. N., **Eddies unusually defined by snow.** *Meteorological Magazine,* London, 83(984):185–186, June **1954.** fig., photo. **MH-BH**—In the enclosed quadrangle of the Meteorological Office at Harrow on Feb. 1, 1954, snow formed two lanes parallel to main windward face of building. A diagrammatic section showing air circulation is given. *Subject Heading:* **1. Eddies.**—*C.E.P.B.*

6.4–234 551.551

†McCready, Paul B., Jr., **Structure of atmospheric turbulence.** California Institute of Technology, Contract Cwb-8290, [Unnumbered Report] Oct. 31, **1952.** 35 p. 7 figs., 34 refs., eqs. **DWB**—The methods of turbulence measurements used in the laboratory (wind tunnel) are applied to the atmosphere and it is shown that Kolmogorov's similarity hypothesis is valid for such studies and can be applied to eddies from one centimeter to a thousand km even

hough the layer eddies are not isotropic. Some data were obtained and analyzed for vertical eat and momentum flux (which are due to nonisotropic eddies) at various heights to see how ood the Kolmogorov hypothesis is for such calculations. It was found to be a good first approximation and allows the energy to be calculated with only 3 measurements: 1) mean wind $\bar{U}$,) intensity of turbulence $\sqrt{\bar{U}^2}$, and either the correlation coefficient or the energy spectrum. Data are presented in detailed graphs and photographs. *Subject Headings:* **1. Turbulence tructure 2. Kolmogorov similarity hypothesis 3. Turbulent heat flux.**—*M.R.*

6.4–235 532.5 551.551

Schröder, Kurt, **Moderne Probleme der Strömungslehere.** [Modern problems of fluid iechanics.] *Akademie der Wissenschaften zu Berlin, Wissenschaftliche Annalen*, 2(2):69–80, eb. **1953.** 14 figs. **DLC**—The logical development of fluid mechanics is shown discussing he equations of continuity, state and motion, Bernoulli's theorem, the circulation theorem nd the flow around obstacles using sinks and sources. The origin of eddies is explained and he phenomena in boundary layers are outlined. *Subject Headings:* **1. Hydrodynamics . Atmospheric turbulence.**—*A.A.*

6.4–236 551.551:598.2

Scorer, Robert S. and Poulter, Robert M., **Do gulls soar dynamically?** *Weather*, 9(7):223–24, July **1954. MH-BH**—Scorer objects to description of gulls over the foreshore as dynamic" soaring (gaining lift by passing from air of one velocity to air of another velocity) hich is impracticable over land. Poulter replies that the gulls in his photo (*Weather*, pril **1954**) were actually soaring in this way. *Subject Heading:* **1. Soaring of birds.**—*C.E.P.B.*

6.4–237 551.551:551.584

*Shcherbakova, L. F., **Issledovanie nekotorykh sposobov kharakteristiki turbulentnogo bmena na osnove dannykh nabliudenii v nizhnem sloe atmosphery.** [Methods of investigatng turbulent exchange by means of observational data in the lower atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 16(78):25–51, **1949.** 8 figs., 6 tables, 8 refs., 2 eqs. **DLC**—Analyzing a series of microclimatological profiles, given in the same volume on . 136–143, the author concludes that for stable conditions Sverdrup's formula gives the best esults, Rossby's formula is adequate for adiabatic and Budyko's equation for convective onditions. Laĭkhtman's theory does not agree with observations. The wind profile for onadiabatic conditions has a definite curvature, depending on stability. *Subject Headings:* **. Atmospheric turbulence 2. Turbulence theory 3. Micrometeorological profiles.**—*A.A.*

6.4–238 551.551

Sheppard, P. A. (*Imperial College of Sci. and Tech., London*), **Current research at Imperial ollege, London, on the structure of turbulent flow.** *U. S. Air Force. Cambridge Research enter, Geophysical Research Papers*, No. 19:155–164, Dec. **1952.** 3 figs., 5 refs. **DWB**—rofiles of wind speed, temperature and humidity were measured, as well as their turbulent uctuations. A special correlogram computer was designed for the evaluation of the data. orrelation figures and energy spectrum are shown. The results depend on the time of nalysis, since bigger eddies are involved if the time is extended. The use of Taylor's Fourierransform method of getting the power spectrum were found to be not entirely adequate. *ubject Headings:* **1. Turbulence measurements 2. Turbulence correlations 3. Turbulence pectrum.**—*A.A.*

WIND EFFECTS

See also: **Meteorological measurements** (Gerhardt), 6.4–342.

6.4–239 551.556:551.579.4

*Bergsten, Folke, **Metoder för eliminering av vindens inflytande på havets vattenstånd och eras tillämpning vid landhöjningsberäkningar.** [Methods for eliminating the influence of ne wind upon water level and its application to measuring land elevation.] *Tekniska Skrifter*,

Stockholm, No. 116, **1945.** 23 p. 8 tables, 7 figs., 8 refs. English summary p. 22–24. **DLC**—The author first describes a previously developed method for eliminating the influence of long period variations of the height of sea level caused by the wind in determining land elevation. It assumes the existence of at least one very long water stage the length of which ought to guarantee that the effect of disturbing factors would be eliminated by smoothing. The results of computation by this method to determine the changes of land-elevation coefficients of Stockholm and to extrapolate the results to other stations with short series are given in tables. In this paper the method developed to eliminate the influence of wind is based upon the "assumption that the surface current caused by the wind increases in proportion to the velocity of the wind." The formulas for calculating the deviation of level caused by the wind and the results of application of this method are given. *Subject Headings:* **1. Wind effects 2. Water level variations.**—*I.L.D.*

6.4–240 551.556:551.465

Verber, James L. (*Ohio State Univ.*), **Surface water movement, Western Lake Erie.** *Ohio Journal of Science*, 53(1):42–46, Jan. **1953.** 6 figs., 3 refs. **DLC**—Three important conclusions about the surface currents in western Lake Erie have been obtained by using drift cards. 1. Drift cards show surface water movement but no stable flow pattern can be established by using drift cards. 2. The drift cards averaged 6.5 mi/day which agrees with velocities measured in the open lake using free floating vanes. 3. There is a direct correlation between wind movement and surface flow in western Lake Erie. From indications of 3200 cards liberated, the surface water is wind controlled. *Subject Headings:* **1. Wind driven currents 2. Lake Erie.**—*Author's abstract.*

6.4–241 551.556:624.21

Steinman, David, **Bridges and aerodynamics.** *New York Academy of Sciences, Transactionst, Ser.* 2, 16(3):125–141, Jan. **1954.** 10 figs. **DLC**—Studies of the aerodynamics of bridges, made by the author since 1938 (two years before the Tacoma Narrows Bridge disaster), reveal several ways of preventing cumulative aerodynamic oscillations which can destroy a bridge more easily than the same forces would from a static point of view. One method (several possible ways of achieving the desired end) is to damp the oscillations or increase the rigidity by girders, trusses or stays properly installed (in the Tacoma Bridge and other similar failures they were improperly installed). The other method is to reduce the aerodynamic effect by design (open slots at predetermined places in the roadway, or changing vertical profile of bridge). The factor not considered before in bridge design is the vertical component of the horizontal wind pressure, which can destroy a bridge which is safe for 50 lbs²/ft horizontal pressure (static forces) with only 5 lbs²/ft vertical pressure. *Subject Headings:* **1. Bridge aerodynamics 2. Vertical wind pressure 3. Wind resistance of bridges 4. Takoma Narrows, Wash.**—*M.R.*

6.4–242 551.556:629.12

Sharpey-Schafer, J. M., **Anchor dragging.** *Institute of Navigation, London, Journal*, 7(3):290–300, July **1954.** 2 figs. **DWB**—The technique of anchoring in a gale, strong wind or tidal stream is discussed. Special weather conditions for dragging include mountain squalls, bunching of isobars by mountains, as in 125 knot gale in Orkneys on 31 Jan. 1953, West African tornadoes and the similar Morning Glory of northern Australia, tropical sea breezes, katabatic winds in northern Adriatic, and shamal of Persian Gulf. *Subject Headings:* **1. Wind effects 2. Navigation.**—*C.E.P.B.*

6.4–243 551.556.1:532.593:551.465:656.608

Rodewald, Martin, **Die Gefahr der achterlichen Sturmsee.** [The danger of poop storm seas.] *Wetterlotse*, No. 73:137–142, July **1954.** fig. **DWB**—On Oct. 16, 1953, the *Claus Böge* with a deck cargo of timber met a depression (970 mb) north of Vardo and had to lie to. Waves up to 8.9 m broke over deck and shifted the cargo which had to be jettisoned. March 31, 1954, "Crowlin" was lost off Norway through high seas due to wave interference at a front. *Subject Headings:* **1. Wind waves 2. Marine disasters.**—*C.E.P.B.*

6.4–244 551.556.1:532.593

§Rodewald, Martin, **Der Untergang des F. D. "Thor" im Nordwestausgang der Nordsee m 8. März 1952.** [The sinking of the "Thor" in the north-west outlet from the North Sea n March 8, 1952.] Pt. 1. *Wetterlotse*, No. 40:81–93, May **1952.** 4 figs., table. Pt. 2, *bid.*, No. 42:113–126, Aug. **1952.** 2 figs. **DLC**—(1) Steam trawlers are very seaworthy ut the "Thor" sank with all hands in 58.8 N, 1.3 W. Wind at Lerwick reached 58 knots in qualls. Loss occurred during passage of a front with fog and drizzle. Heavy swell from .E. was combined with gale and wind-waves from S. to produce dangerous conditions. (2) 'he sea disturbance was made up of a swell from 155° and wind waves from 170°. The nterference of these, and the effect of shallowing water, are analyzed. The wreck occurred 'here the wave crests became steeper and tended to break, possibly intensified by wind blowing gainst the current. Capsizing may have been due to resonance between ship's natural roll nd wind waves, but this cannot be proved. *Subject Headings:* **1. Wind waves 2. Wind amage 2. Wave heights.**—*C.E.P.B.*

6.4–245 551.556.1:551.465:656.608

Yoshizawa, Z., **Shipwreck in the Kurushima Channel.** *Journal of Meteorological Research, Tokyo*, 4(9):737–740, Feb. **1953.** 2 figs., 2 tables. In Japanese; English summary p. (45). **MH-BH**—The Kurushima Channel is the most dangerous path in the Inland Sea. During he last ten years 81 shipwrecks were reported from this channel. The accidents may be lassified into two major groups, sinking and stranding. Owing to orographic convergence he winds blowing over the channel are strong and turbulent, even at times when there is only verage wind over the sea. The channel wind acts on the fast tidal current (7.4–8.5 mph.) n an acute angle. It is difficult to forecast this channel wind from synoptic weather maps. *ubject Headings:* **1. Shipwrecks 2. Wind effects 3. Kurushima Channel, Japan.**—*From uthor's abstract.*

UPPER AIR WINDS

See: **Wind-maximum in low levels** (Means), 6.4–145; **Anticyclone over Japan** (Kamiko), 6.4–151; **Atmos. winds** (Kennedy), 6.4–216.

VERTICAL CURRENTS

See also: **Buoyant motion . . .** (Priestley), 6.4–128.

6.4–246 551.558:598.2

Fischer, Rundolf (*Nahariya, Israel*), **Wo sind die Störche?** [Where are the storks?] *Vetter und Leben*, 5(5–7):123–125, Aug. **1953. MH-BH**—The author offers an explanation or the observed absence of storks in Austria during the summer of 1953. He attributes it to he fact that the east wind or Khamsin which aids the storks in their northward flight during arly spring was very weak and intermittent in 1953 so that only a few reached Europe while any remained in Israel. *Subject Headings:* **1. Khamsin 2. Bird migrations.**—*I.L.D.*

6.4–247 551.558:551.511:551.524.7

§Fleagle, Robert G., **A study of the effect of vertical motion and advection on upper air emperatures.** A partial progress report of a research project sponsored by the U. S. Army, Navy, and Weather Bureau . . . New York, Dept. of Meteorology, College of Engineering, New York Univ., March **1946.** 12 p. 4 figs. (1 fold.) **DWB**—The effect of vertical motion nd advection on local range of potential temperature are compared at 10,000 ft and just above he tropopause during the deepening and filling of a cyclone and during the transition of a olar anticyclone to a high level anticyclone. The comparison indicates that neither vertical notion nor advection alone gives a reliable measure of the sign or the magnitude of the local hange of potential temperature. *Subject Headings:* **1. Vertical motion 2. Advection . Tropopause 4. Upper air temperatures 5. United States. I. New York Univ. College of ngineering. Dept. of Meteorology.**—*Author's abstract.*

6.4–248 551.558:598.2

Rossmann, F. (*Patrick, Fla.*), **Vom Geleitflug der Möven.** [Gliding flight of sea gulls.] *Wetter und Leben*, Vienna, 5(8/10):172–173, Nov. **1953. DWB**—The flight of sea gulls behind ships is a gliding flight depending upon the upwind created in the wake of the ship by its movement. A description of the flight of sea gulls under varying wind conditions observed by the author on the outward journey from Bremerhaven is given. *Subject Headings:* **1. Artificial wind currents 2. Sea gull flights.**—*I.L.D.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROLOGY

HUMIDITY

See also: **Transparency coef.** (Savinov), 6.4–175; **Precipitable water** (Porter), 6.4–191; **Meteorological research** (Akedo), 6.4–315; **Humidity-fixing effect** (Kitamura), 6.4–316.

6.4–249 551.571:551.501.4:629.13

Williams, J. A. C., **Atmospheric wet bulb temperature.** *Aircraft Engineering*, 24(282): 221–222, Aug. **1952.** 2 figs., table. **DLC**—Wet bulb temperature is defined, tables and nomograms presented and applications cited. Effect of moisture on density of air as affecting aircraft performance is small except in tropics but effect on air conditioning in planes may be large. However, if mean values of moisture content for place, season and time of day are used the errors will be negligible even in the topics. *Subject Headings:* **1. Humidity effects 2. Wet bulb temperature 3. Aeronautical meteorology.**—*M.R.*

EVAPORATION

6.4–250 551.573

*Mather, John R., **A summary of evapotranspiration at Seabrook, New Jersey.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(1):7–51, **1954.** 12 figs., 10 tables, 9 refs. Append. p. 29–51. **DWB**—Daily values of computed and measured potential evapotranspiration for a battery of up to 7 evaporation tanks are communicated for the period Aug. 1947 to Dec. 1953, including also daily precipitation and temperature data. Thornthwaite's formula systematically underestimates the potential evapotranspiration in winter (factor 2.8 in Jan.) and slightly overestimates in summer (factor 0.91 in July). A study of the effect of water level and watering techniques revealed that sprinkling from above is preferred, giving a more uniform moisture distribution in the tank, with more accurate results. The potential evapotranspiration definitely depends on the development state of the plants (spinach, corn, peas) while a grass cover gives more uniform measurements. *Subject Headings:* **1. Potential evapotranspiration 2. Evapotranspiration 3. Thornthwaite's method 4. Seabrook, N. J.**—*A.A.*

6.4–251 551.573

*Mather, John R., **A summary of additional evaporation and evapotranspiration measurements.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(1): 177–199, **1954.** 14 figs., 11 tables, refs. **DWB**—Monthly evapotranspiration data for tanks with constant water level at different depths, obtained at the Everglades Experiment Station (Florida), at various locations in southwestern United States, Coshocton (Ohio), Zerafant (Sudan) and Yangambi (Belgian Congo) are compared with the computed potential evapotranspiration, giving in general a good agreement with Thornthwaite's formula. The effect of water depth depends on the type of soil. Evaporation from lakes (data given), is greatly affected by the lag of water temperature behind the air temperature. Both the tank evapotranspiration and tank evaporation can be expressed as a simple power law of the temperature in C°. *Subject Headings:* **1. Evapotranspiration data 2. Evaporation from lakes 3. Thornthwaite's method 4. United States 5. Sudan 6. Belgian Congo.**—*A.A.*

6.4–252 551.573

Ostromęcki, Jerzy (*Bydgoszcz I.U.N.G. Dzial Gospodarski Wodnej*), **Evaporation from the surface of meadows on deep loams.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels, 1951* [*Transactions*], 3:452–462. Pub. **1952.** 8 figs., table, eqs. **DWB**—Technical reports on three years of experiments conducted with eight lysimeters with constant ground water level from 40–130 cm beneath the surface. Formula adopted: $P_t=\frac{0.37}{0.2h}\Sigma d(1+0.25\sqrt[3]{Q_z^2})$. P_t—evapotranspiration for the period of vegetation of one swath (mm); Σd—total of daily mean saturation on deficit (mb); h—ground water distance (m); Q_z—crop of green mass. Water requirement on peat twice as much as on loam. *Subject Headings:* **1. Evapotranspiration 2. Lysimeters.**—*A.A.*

6.4–253 551.573:551.579:63

Ostromęcki, Jerzy, **Les recherches de l'équilibre du bilan d'eau des bassins marécageux améliorés, Partie 2. La carte des besoins d'eau.** [Studies on the equilibrium of the water balance of large ameliorated basins, Pt. 2. The map of water needs.] *I.U.G.G. Association of Scientific Hydrology, Oslo, 1948, Transactions,* 1:75–82, [n.d.] **DWB**—Author developed a formula for the dependence of meadow evapotranspiration on the weight of a single crop, the saturation deficit and the depth of the ground water level (h). It is assumed that $h=\frac{H}{3}$ is the optimal ground water distance (H—total precipitation during one crop period). The saturation deficit was computed from temperature and precipitation records by means of an empirical relationship. A map of Poland gives the water need for the first hay crop, computed as the difference between optimal evapotranspiration and actual precipitation. A summary of published sources for the water need of meadows is added. *Subject Headings:* **1. Evapotranspiration 2. Hydroclimatic maps 3. Agricultural climatology 4. Poland.**—*A.A.*

6.4–254 551.573:533.15:533.6

Owen, P. R. and Ormerod, A. O., **Evaporation from the surface of a body in an airstream (With particular reference to the chemical method of indicating boundary-layer transition.)** *Great Britain. Aeronautical Research Council, Reports and Memoranda,* No. 2875(14,604), **1954.** 42 p. 17 figs., 8 tables, 28 refs., eqs. **DLC, GB-MD**—A method is described of predicting the rate of sublimation of a substance on a flat plate in turbulent or laminar flow by determining the transport of a foreign gas through a boundary layer, given the concentrations at the surface and in the main stream. The "concentration" of the gas is given by expressions involving a measurable coefficient which has been determined for some liquids (including water) and solids. It is shown that the effects of molecular diffusion in the laminar sub-layer may be important. A calculated example confirms that the rate of sublimation of a substance from the surface of an aircraft decreases very rapidly with increasing height. *Subject Headings:* **1. Aerodynamic theory 2. Evaporation theory.**—*C.E.P.B.*

6.4–255 551.573:631.67 551.551

*Preobrazhenskiĭ, T. N., **Velichina summarnogo vodopotrebleniia kul'turami pri oroshenii v iuzhnykh nekhlopkovykh raĭonakh Kazakhstana.** [Total amount of water consumption of crops in the irrigated non-cotton regions of the southern Kazakhstan.] *Moscow. Vsesoiuznyĭ Nauchno-Issledovatel'skiĭ Institut Gidrotekhniki i Melioratsii, Trudy,* 26/27:125–136, **1952.** 6 tables. Also: Wegner, Maximilian (*Berlin*), **Eine neue Methode der Bestimmung der Verdunstungshöhe auf Rieselfeldern und bewässerten Kulturen.** [A new method of estimating the evapotranspiration of crops from irrigated fields.] *Wasserwirtschaft-Wassertechnik,* Berlin, 2(11):378–379, Nov. **1952.** 2 tables, eqs. **DLC**—Study of the total transpiration of wheat, sugar beet and lucerne, depending on solar radiation and psychrometric difference at average, reduced, and maximum water supply for different yields. Some data are also given for the influence of wind speed as well as of the ground water level for different kind of soils. WEGNER summarizes, but not with complete accuracy, the paper of PREOBRAZHENSKIĬ. *Subject Headings:* **1. Transpiration 2. Agricultural climatology 3. Irrigation 4. Turbulent transfer of moisture.**—*A.A.*

6.4–256 551.573:551.311.12

Renaud, André, **Observations on the surface movement and ablation of the Gorner glacier (Switzerland).** *Journal of Glaciology*, 2(11):54–57, March **1952.** fig., 2 maps, 2 tables, 2 refs. **DWB**—Describes measurements of ablation and movement Oct. 1949–Oct. 1950 on posts sunk in the ice. Results are compared with other years and other glaciers. The mean annual ablation decreased from about 8 m at a height of 2000 m in 1949 and 1950 (less in 1948) to zero above 3000 m. Ablation gradient 0.6 m per 100 m. *Subject Headings:* **1. Ablation 2. Glaciers 3. Switzerland.**—*C.E.P.B.*

6.4–257 551.573:551.579.5

Smolik, Ladislav, **The water evaporation from a South Moravian soil during the very dry year 1947.** *I.U.G.G. Association of Scientific Hydrology, Oslo 1948*, [*Transactions*], 1:55–59, [n.d.] 4 figs. **DWB**—Graphical presentation of soil evaporation, temperature of soil and air (wet and dry bulb), wind velocity and evaporation from Wild and Piché evaporimeters for April to Oct. 1947. Soil evaporation is most closely correlated to soil temperature. Effect of soil moisture content on evaporation studied. Evaporation from natural soil was much higher than measured precipitation. *Subject Headings:* **1. Evaporation from soil 2. Soil moisture 3. Brno, Czechoslovakia.**—*A.A.*

CONDENSATION

See also: **Charging of atmos. droplets** (Gunn), 6.4–7; **"Washing off" hoar frost** (Madlibowska), **6.4–102.**

6.4–258 551.574.1

Dorsey, N. Ernest, **Spontaneous freezing of water.** *Scientific Monthly*, 78(5):283–288, May **1954.** 7 figs., 2 tables. **DWB**—Although experiments with supercooled water had been carried out prior to 1870, the general scientific opinion on this phenomenon ignored earlier findings. Twelve ill-founded opinions are summarized and contradicted by the author's own experiments carried on over 12 years. Supercooling up to −17.8°C was achieved. A working hypothesis on ice nuclei is proposed which considers the convexity of the adsorbing surface. *Subject Headings:* **1. Supercooled water 2. Ice nuclei 3. Spontaneous freezing.**—*A.A.*

6.4–259 551.574.1:551.578.41

Kozima, Kenzi, **Change in shape of snow crystals, Pts. 2 and 3.** *Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, Low Temperature Science*, No. 9:187–214, **1953.** 3 figs., 11 plates, 2 refs. In Japanese; English summaries p. 193–194, 208–209. **DWB**—Changes of shapes of various kinds of snow crystals in an atmosphere saturated with water vapor at temperatures below 0°C were observed. An isolated dendritic type crystal turned into ice rods in 36 days after being kept at a temperature of −7°C. The ice rods united into spheroids. Other crystals kept at −7°C for 51 days changed into gravel-like forms such as those characteristic of snow particles of an old snow cover Photographs showing the change in snow crystals at various temperatures are presented. *Subject Headings:* **1. Snow crystal formation 2. Ice crystals.**—*I.L.D.*

6.4–260 551.574.1:551.588.6

Kozima, Kenzi; Oono, Taketoshi and Yamaji, Kenji, **On the size distribution of fog particles in the vicinity of fog-preventing forest.** (In: Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, **Studies on fogs in relation to fog-preventing forest. 1953.** p. 311–326. 8 figs., 2 tables, 4 refs.) **DWB**—Drop size of fog and fog water contents were measured by the method of microphotography in the vicinity and in interior of a forest composed of conifer trees about 18 m high. "Fog density at a spot in the forest was found to diminish exponentially with its distance from the windward edge of the forest. The quantity of fog water caught by the top of the forest was estimated from the values of fog water contents in air determined at various heights above the ground. Night fog became denser as the air

temperature rose and from this fact it was concluded that the extent of an air mass carrying a uniform fog was about 16 km. Evaporation of fog particles near the ground surface in daylight hours was discussed." The observed size distribution of fog particles is expressed by BEST's formula. *Subject Headings:* **1. Fog drop size distribution 2. Fog prevention 3. Forest influences.**—*I.L.D.* (*based on authors' abstract*).

6.4–261 551.574.1

Kozima, Kenzi; Oono, Taketoshi and Yamaji, Kenji, **The size distribution of fog particles.** (In: Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, **Studies on fogs in relation to fog-preventing forest. 1953.** p. 303–309. 2 figs., 3 tables.) **DWB**—A device and procedure for catching fog particles are described. The fog drops caught in a thin layer of oil spread on a glass slide were photographed and the diameter of the drops was measured on the enlarged positive print. On the basis of fog particle diameters, fogs are classified into four groups: (1) fogs with particles larger than 60μ, (2) fogs in which the number of particles smaller than 10μ in diameter exceeds 70% of the total number, (3) fogs in which particles smaller than 10μ are less than 70% of total and particles larger than 20μ are less than 35% and (4) fogs in which the number of particles larger than 20μ exceeds 35% of total and number of particles larger than 60μ are included. *Subject Headings:* **1. Fog particles 2. Fog drop size 3. Fog drop size distribution.**—*I.L.D.*

6.4–262 551.574.1:519.241

Leigh-Dugmore, C. H., **Simplified particle-size calculations.** *Nature*, London, 174(4429): 567, Sept. 18, **1954.** fig., 5 refs., 4 eqs. **DWB**—A method is described of plotting particle-size distribution in a sample on log-probability paper for numerical calculation. For rapid approximate results with small samples, the largest and smallest particles are picked out and logarithms y_1, y_n of their sizes found. A rough estimate is made of total number n. Then mean size is taken as $\frac{1}{2}(y_1+y_n)$, S.D. as $(y_1-y_n)/w$ where w is expected range for a sample of n. *Subject Headings:* **1. Aerosols 2. Statistical analysis.**—*C.E.P.B.*

6.4–263 551.574.1

*Moyerman, Robert M. and Shuler, Kurt E. (*Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.*), **The concentration of contaminant alkali salts in ground level air.** *Science*, 118(3073):612–614, Nov. 20, **1953.** 2 tables, figs., 35 refs. **DWB**—Literature on salt concentration in air is reviewed. The review refers to papers on the origin of nuclei, variations of their concentration, and techniques for determining concentration of alkali halides. The authors also present tables giving average concentrations of alkali salts in ground level air, as reported from 11 coastal and 5 inland locations throughout the world. *Subject Heading:* **1. Saline nuclei.**—*G.T.*

6.4–264 551.574.1:531.32

Schlögl, Reinhard, **Zur Statistik idealer Mischungen unter Berücksichtigung des Raumbedarfs der Teilchen.** [On the statistics of ideal mixtures taking account of the space needs of particles.] *Zeitschrift für Physikalische Chemie*, 202(5/6):379–389, Jan. **1954.** 3 figs., 9 eqs. **DLC**—The classical BOLTZMANN treatment of ion distribution in a diffuse double layer is extended by a statistical treatment. This also gives functions for settlement of particles of finite size in a gas. *Subject Heading:* **1. Aerosols.**—*C.E.P.B.*

6.4–265 551.574.1 551.311.1 548

Shumshiĭ, P. A., **Stoenie prirodnykh l'dov.** [Structure of natural ice.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 86(1):20–33, Jan./Feb. **1954.** 4 figs. **DLC**—The author considers the mineralogical and crystallographic characteristics of ice, the growth of ice crystals and the formation of ice in relation to waters of origin, a comparison between ice formed in the free atmosphere and that which forms on solid surfaces, the petrographic study of ice and the properties and types of congelated ice. *Subject Headings:* **1. Ice formation 2. Ice crystal growth 3. Crystallography.**—*I.L.D.*

6.4–266 551.574.1

Vonnegut, Bernard and Neubauer, Raymond L., **Production of monodisperse liquid particles by electrical atomization.** [and] Vonnegut, Bernard; Geller, Myer, and Maynard, Kiah. **Multiple-stage delution of aerosols by use of aspirators.** General Electric Research Laboratory Project Cirrus, Occasional Report, no. 36/37; Contract DA-26-039-sc-15345, Occasional Report, No. 7/8, Oct. 1, **1952.** 6+3 p. 6+3 figs., refs., 3 eqs. **DWB**—Report 36: Streams of highly electrified uniform droplets about 0.1 mm in diameter can be produced by applying potentials of 5–10 kilovolts a.c. or d.c. to liquids in small capillaries. Monodisperse aerosols having a particle radius of a micron or less can be formed if the capillary is positively charged and if liquids having low electrical conductivity are used. Aerosols formed in this way show the colors of higher order Tyndall spectra. Report 37: An apparatus has been developed for the purpose of rapidly diluting aerosols of very high concentrations of small particles such as condensation nuclei. *Subject Headings:* **1. Aerosol production 2. Atomization of liquids. I. Geller, Myer II. Maynard, Kiah.**—*Author's abstract.*

6.4–267 551.574.1

Vonnegut, Bernard, **Thin films of supersaturated solutions for detecting, counting, and identifying very small crystalline particles.** General Electric Research Laboratory, Schenectady, Contract DA-36-039-sc-15345, Project Cirrus, Occasional Report, No. 34, April 15, **1952.** 3 p. **DWB**—A simple technique for collecting aerosol particles is described. Two miscible solvents, one volatile and one nonvolatile, are used. The substance investigated is dissolved in the volatile solvent and this unsaturated solution added to the nonvolatile solvent, thus producing films of any desired degree of supersaturation after the volatile solvent evaporates. Crystalline particles of the substance in respect to which the solution is supersaturated, grow rapidly when they come in contact with the solution and can be identified. The method was used to detect and count sodium chloride and silver iodide particles with diameters of the order of 100 Å. *Subject Headings:* **1. Aerosols 2. Nuclei count 3. Hygroscopic nuclei 4. Nuclei identification.**—*G.T.*

6.4–268 551.574.42

Crowdy, Michael, **Rime on Fairfield Fells.** *Weather*, 9(7):216, July **1954.** 3 photos. **MH-BW**—A short note and 3 excellent photos of rime 6–7 inches long on grass and wire around 2000 ft. Higher up, and on bare ground at 2000 ft the surface was covered by clear hard ice. *Subject Heading:* **1. Rime deposits.**—*C.E.P.B.*

6.4–269 551.574.42

Itoo, K. (*Met. Res. Inst., Tokyo*), **On skeleton-shaped depth-hoar.** *Geophysical Magazine*, Tokyo, 24(1):23–24, Aug. **1952.** 5 figs. **MH-BH**—Microphotographs of different types of hoar crystals are presented. The fundamental type is the hexagonal skeletal twin prism. Cubic or tetragonal systems could not be observed. The author states that rectangular hoar cannot exist under normal atmospheric pressure. *Subject Headings:* **1. Hoar frost crystals 2. Ice crystals.**—*A.A.*

6.4–270 551.574.42:551.509.59

Otta, Endréné, **A zuzmara elörejelzése.** [Rime forecasting.] *Időjárás*, 57(1):8–19, Jan./Feb. **1953.** 10 figs., refs. Russian and French summaries p. 8. **DLC**—Principal characteristics of weather situations leading to intense rime formation in Hungary during the last 20 years are described in general terms. A few synoptic situations which were accompanied by record rime deposits on power lines are analyzed and illustrated by pressure charts and cross sections. *Subject Headings:* **1. Rime formation 2. Rime forecasting 3. Hungary.** —*G.T.*

6.4–271 551.574.7:629.13

Coles, Willard D. and Ruggeri, Robert S. (*Lewis Flight Propulsion Lab., Cleveland*), **Experimental investigation of sublimation of ice at subsonic and supersonic speeds and its relation to heat transfer.** *U. S. NACA, Technical Note*, No. 3104, March **1954.** 29 p. photo. **DWB**—An experimental investigation was conducted in the 3.84- by 10-inch tunnel to de-

ermine the mass transfer by sublimation, heat transfer, and skin friction of an iced surface t subsonic speeds. The results show that the Stanton numbers of sublimation and heat ransfer were increased 40 to 50 percent for an iced surface of moderate roughness as compared vith those obtained for a bare plate. For ice surfaces of equivalent roughness, the ratio of ublimation to heat-transfer Stanton numbers was found to be 0.90. Sublimation Stanton umbers obtained at a Mach number of 1.3 showed no appreciable deviation from those btained at subsonic speeds. Sublimation as a means of removing ice formations of ap- preciable thickness is so slow as to be of little value in the de-icing of aircraft at high altitudes. *Subject Headings:* **1. Sublimation of ice 2. De-icing of aircraft 3. Supersonic air speeds.**—*NACA abstract.*

FOG

6.4–272 551.575.1:656.6

§Seilkopf, H., **Rückblick auf sommerliche Seenebel, 1953.** [Retrospect on summer sea og, 1953.] *Wetterlotse*, No. 63/64:214–216, Nov./Dec. **1953.** 2 figs. **DWB**—Sea fogs specially in early summer due to advection of warm moist air over cold sea. These are a anger to navigation; examples of loss of ships are listed. *Subject Headings:* **1. Sea fog . Marine disasters.**—*C.E.P.B.*

CLOUDS

6.4–273 551.576

McGill University. Macdonald Physics Laboratory. Stormy Weather Research Group, **heoretical investigation of cloud and precipitation physics and dynamics and the properties f clouds and precipitation, as determined from the analysis of data provided by radar probings f storms.** Contract AF 19(122)-217, Progress Reports, No. 1/2–6, April 1, 1950–Sept. 20, **951.** 5 pieces. figs., graphs, eqs. **DWB**—These reports summarize current work of the tormy Weather Research Group. (For Progress Reports no. 3 and 4, *see items* 4.11–204 and .11–205, Nov. 1953, *MAB.*) *Subject Headings:* **1. Cloud physics research 2. McGill Univ. tormy Weather Research Group. I. Marshall, J. S. II. Rigby, E. Caroline.**—*A.M.P.*

PRECIPITATION

See also: **Meas. of precip.** (Hoeck), 6.4–31; **Mountain rainfall** (Bransky-Williams), 6.4–33; **Wind-maximum in low levels** (Means), 6.4–145; **"Baiu"—high pressure** (Kawazoi), 6.4–152; **Anticyclone movement** (Sakai), 6.4–153; **Heat and drought** (Sanson), 6.4–199.

6.4–274 551.577.38(79)

Balchin, W. G. V. and Pye, Norman, **The drought in the Southwestern United States.** *Veather*, 8(8):233–236, Aug. **1953.** 4 photos. **MH-BH**—The effects of a period of rainfall elow normal since 1942 in the semi-arid south-west are described. Ground water level is alling and the water is becoming salt. *Subject Headings:* **1. Drought 2. United States.**—*.E.P.B.*

6.4–275 551.577.38:551.577.36

*Barger, Gerald L. and Thom, H. C. S., **Evaluation of drought hazard.** *Agronomy Journal*, Geneva, N. Y., 41(11):519–526, Nov. **1949.** 5 figs., 7 tables, eqs. **DLC**—The frequency istribution of rainfall for n successive weeks as observed at a number of stations in Iowa is escribed by an incomplete Γ-distribution, applying the method of maximum likelihood. he probability of receiving less rain than a given amount within n weeks can be evaluated om tables. (*See also* following item, 6.4–276.) *Subject Headings:* **1. Rainfall frequency istribution 2. Drought characteristics 3. Iowa.**—*A.A.*

6.4–276 551.577.38:631

*Barger, Gerald L. and Thom, H. C. S., **A method for characterizing drought intensity in owa.** *Agronomy Journal*, Geneva, N. Y., 41(1):13–19, Jan. **1949.** 9 tables, 6 figs. **DLC**—omparing deviations of the corn yield for 55 years from the general trend with the rainfall uring n successive weeks any time during the growing season, the total n—weeks rainfall

was found below which drought damage can be assumed. Parabolic equations for these threshold values are given for a number of stations, from which the rainfall deficit can be computed. Twenty-five to sixty per cent of the total variation in yield can be explained by this criterion. *Subject Headings:* **1. Drought characteristics 2. Corn yield 3. Drought intensities 4. Iowa.**—*A.A.*

6.4–277 551.577.38

*Bider, Max (*Basel*), **Bemerkungen zum Quotienten Niederschlagsmenge: Sättigungsdefizit als Dürremass.** [Remarks on the quotient precipitation—saturation deficit as a measure of drought.] *Schweizerische Naturforschende Gesellschaft, Geneva, Davos, etc., Verhandlungen*, p. 120–121, **1951.** tables. **DLC, DWB**—A comparison between the N/S quotient for Basel, Geneva, Sitten, Bern, Zurich, Davos and Lugano, for the periods 1864–1900, 1901–1940 and 1940–1949 shows lower values for the last decade than in the two previous periods since 1864. Seasonal values for the 1940–49 decade are also given, showing very low values at Sitten, Basel and Geneva in spring, summer and autumn. *Subject Headings:* **1. Meyer's drought index (N/S) 2. Drought 3. Switzerland.**—*M.R.*

6.4–278 551.577.38(410)

Bleasdale, A. and Rowsell, E. H., **The dry weather of early 1953.** *Weather*, 8(5):147–152, May **1953.** 3 figs., table. **MH-BH**—The rainfall of Jan.–March was little more than half the normal. Driest period Feb. 20–March 25. Maps given and consequences discussed. *Subject Headings:* **1. Drought 2. Great Britain.**—*C.E.P.B.*

6.4–279 551.577.38:551.579.4

Bratránek, Alois, **Dlouhodobé předpovedi vodnich průtôku na Vltavě ve Štéchovicích pro obdabi Sucha.** [Long time forecasts of discharge of the Vltava at Štéchovice during periods of droughts.] Prague, Zprávy veřejne služby technicke, **1938.** 19 p. 5 figs., 6 tables, 7 eqs. French summary p. [19]. Abstracted from reprint.—Long term forecasts of discharges (Q) of the river Vltava at Štéchovice during periods of droughts. (See French résumé.) *Subject Headings:* **1. Drought 2. Forecasting stream flow 3. Czechoslovakia.**—*G.W.B.*

6.4–280 551.577.38(773)

Buswell, Arthur M., **Effects of drought in Illinois.** *American Water Works Association, Journal*, 46(5):395–402, May **1954.** 3 figs., 3 refs. **DLC**—Statistical charts (precipitation deficiency) characterizing the progress of the severe drought April 1952–Jan. 1954 in Illinois are discussed. A wind flow pattern (Aug. 30, 1953) of the type usually associated with summer drought over the U. S. is presented. Emergency measures, involving hauling and pumping of water to drought-stricken areas, are described. *Subject Headings:* **1. Drought 2. Illinois.**—*G.T.*

6.4–281 551.577.38

Davis, Kenneth S., **Under the enormous, pitiless sky.** *New York Times Magazine*, July 19, **1953.** p. 8, 16–17. illus. **DWB**—Popular description of the 1953 drought, one of the worst in the history of Kansas. No dust storms have been observed as in the thirties, perhaps thanks to anti-erosion measures. *Subject Headings:* **1. Drought 2. Drought, Kansas (1953) 3. Kansas.**—*A.A.*

6.4–282 551.577.38

De Marchi, Giulio (*Politecnico de Milano*), **La période de sécheresse entre 1942–49 en Italy.** [The period of drought between 1942–1949 in Italy.] *I.U.G.G. Association of Scientific Hydrology, Brussels*, 1951, *Transactions*, 3:44–51. Pub. **1952.** 10 figs., 2 tables. **DWB**—Precipitation normals are computed for 7 stations covering periods up to 196 years and discharge records up to 72 years. The sequence of dry years between 1942–49 is compared with similar drought periods observed before. The precipitation during the period was well below normal in all months. *Subject Headings:* **1. Drought periods 2. Precipitation deficiency 3. Italy.**—*A.A.*

6.4–283 551.577.38(46)

*Dué Rojo, Antonio, **Años de sequia.** [Years of drought.] *Revista de Geofísica*, Madrid, 12(47):227–233, July/Sept. **1953.** tables. **MH-BH**—Rainfall and temperature data for Granada are analyzed for each season and agricultural year from 1902–1952, with respect to departures from normal, to show the years and sequences of dry or wet periods. Many factors which complicate the analysis of pure data with respect to drought are mentioned and examples given. Season, intensity of rain, direction of dry or wet spells in any given season and other factors mask or compensate for apparent excesses or deficiencies. That is why the agricultural year (Sept.–Aug.) is used instead of the calendar year. (1917 was a dry year but the preceding fall compensated for the great calendar year deficiency.) *Subject Headings:* **1. Drought 2. Wet years 3. Granada, Spain.**—*M.R.*

6.4–284 551.577.38:551.579

Havens, A. V. (*Dept. of Met., Rutgers Univ.*), **Drought and agriculture.** *Weatherwise*, 7(3):51–55, 68, June **1954.** 2 photos. **MH-BH**—Drought is defined with respect to effect of lack of rain on vegetation and water supply in regions where there is ample for purposes of normal human activity. Historic droughts in the U.S.A. are described; regions most affected by drought are outlined and shown on maps; damage from drought, causes and long-range factors which might be considered in forecasting drought are discussed. Proposed methods of preventing drought are: a) rain making—not considered effective and b) conservation measures suggested are: 1) vegetative cover to prevent wind erosion, 2) prevention of runoff by terracing and contouring, 3) reducing evaporative moisture loss by shelter belts and 4) supplemental irrigation for brief moisture deficiencies. Excesses must also be conserved properly. *Subject Headings:* **1. Drought 2. Drought prevention 3. Soil conservation 4. United States.** —*M.R.*

6.4–285 551.577.38:551.579.5

Kitazawa, S. and Kobayashi, K., **On the index of drought.** *Journal of Meteorological Research*, Tokyo, 5(3):119–124, March **1953.** 4 figs., 2 tables. In Japanese; English summary p. 119. **MH-BH**—From results of soil moisture measurements made during the period June 26–Nov. 1, 1951, and an investigation of concurrent weather elements, the authors conclude that the total sum of evaporation amount minus the total sum of rainfall amount during that period is appropriate as an index of drought. The index thus defined is applied to drought data for Nagano and found to be adequate for identifying a drought year objectively. *Subject Headings:* **1. Aridity index 2. Drought.**—*From authors' abstract.*

6.4–286 551.577.38

§Klein, William H. (*U. S. W. B., Wash., D. C.*), **The weather and circulation of July 1952. A month with drought.** *Monthly Weather Review*, 80(7):118–122, July **1952.** 5 figs., 8 refs. **MH-BH**—Temperatures were well above normal in the eastern two-thirds of the United States and precipitation was subnormal in this same area. A marked persistence was noted between June and July. Serious drought was reported from Maine to Georgia and west to Texas and Kansas. Chattanooga, New York City and other places reported hottest 10-day period on record in mid-July. In the United States anticyclonic conditions prevailed and cyclones were absent. In Canada the reverse occurred. Illustrative anomaly, mean pressure, jet stream, storm track and vorticity charts accompany the text. *Subject Headings:* **1. Drought, United States (1952) 2. Anomalies 3. Heat waves 4. Eastern United States.**—*M.R.*

6.4–287 551.577.38:551.524.36

§Klein, William H., **The weather and circulation of August 1953. Featuring an analysis of dynamic anticyclogenesis accompanying record heat and drought.** *Monthly Weather Review*, 81(8):246–254, Aug. **1953.** 12 figs., table, 11 refs. **MH-BH**—The spread of the drought area from the Lake States to the whole central and southwestern parts of the United States, between Aug. 15 and Sept. 2, 1953 is shown by means of 3 charts, and the simultaneous spread of the heat wave (temperature anomaly) during the same period by 3 more 5-day mean charts. The pressure charts show the transformation of an anticyclone from the Pacific Northwest and its stagnation over the Ohio Valley where it warmed and deepened accompanied

by a 10°C cooling in the stratosphere (i.e., at the 100 mb level). Relation to the broad scale circulation is also shown. *Subject Headings:* **1. Drought, United States (1953) 2. Heat waves 3. United States.**—*M.R.*

6.4–288 551.577.38

§Klein, William H., **The weather and circulation of September 1953. Another dry month in the United States.** *Monthly Weather Review*, 81(9):304–308, Sept. **1953.** 7 figs., 8 refs. **MH-BH**—The fourth consecutive hot dry month in many parts of the central and eastern United States (as well as the Southwest where drought had prevailed for over a year), Sept. 1953 was characterized by subnormal precipitation in every state but Washington and the Southeastern States. Arizona had only 1% of normal, Utah 8% and New Mexico 9%, whereas for the 3 summer months, Missouri had <44% of normal. The Mississippi River at Memphis was the lowest in history on Oct. 5. The 700 mb circulation anomaly revealed by mean monthly, height and deviation from normal contours was in the form of an unusually marked high level anticyclone (positive height departure) over the entire West. A contrasting negative height anomaly in the Southeast corresponded to the < normal temperature and heavy rains in Florida. *Subject Headings:* **1. Drought, United States (1953) 2. Atmospheric circulation anomalies 3. High level anticyclones 4. United States.**—*M.R.*

6.4–289 551.577.38:523.74

Krick, Irving P. et al, **Is the drought over?** *Farm Journal*, Philadelphia, 78(3):31, 67, March **1954.** graph. **DWB**—The author maintains that the drought which has been increasingly serious in the Southwest U. S. in 1952 and 1953 should be over by 1954 or 1955 if the evident positive correlation between drought and decreasing or minimum sunspot activity holds; for in the next 5 years the sunspot activity will be increasing rapidly. The chart shows sunspot minimum and drought in 1912–14, 1923, 1932–34, 1944 and 1953, and maximum in 1908, 1918, 1928, 1938 and 1948. However he claims that decreasing ground water resources will continue to plague the midwest and west because of increase in water use and population. *Subject Headings:* **1. Drought, United States (1953) 2. Sunspots and drought 3. Ground water resources 4. Southwest United States.**—*M.R.*

6.4–290 551.577.38(791)

La Farge, Oliver, **A drought is slow lightning.** *New York Times Magazine, Sec. 6*, p. 7–9, 49–50, Aug. 15, **1954.** photos. **DWB**—Details of farmers' plight in a climate providing, at its best, barely enough moisture for pastures and farms are described against the pathetic background of the current drought in New Mexico. Characteristics of normal and deficient rainfall occurrence in the area are discussed. *Subject Headings:* **1. Drought 2. Arizona.**—*G.T.*

6.4–291 551.577.38:551.579.5

Lambor, Julian, **Przyczyny pogłębiających się okresów suszy na nascych ziemliach.** [Causes of increasing droughts in Poland.] *Przegąld Meteorologiczny i Hydrologiczny*, 5(3/4): 36–58, **1952.** English summary p. 53. **DWB**—The phenomenon of increasing droughts, the long-range gradual drying of the climate manifested in biocenotic changes in the plant and animal kingdom and their causes are discussed in the light of Alwin Seifert's and Wadiczko's theories on "versteppung" of Germany and Greater Poland. The phenomenon is caused by deforestation and poorly executed measures of soil conservation and river regulation leading to a reduction of the free water area and lowering the levels of ground water. This ubiquitous reclamation without simultaneous flooding of land (in case of need) has undoubtedly played an important role in the process of "versteppung" of Poland. Concludes with suggestions for some preventive measures. *Subject Headings:* **1. Drought 2. Deforestation 3. Soil conservation 4. Soil moisture deficiency 5. Drought prevention 6. Poland.**—*A.M.P.*

6.4–292 551.577.38:551.311.3

Lloyd, Bob, **The dust blows again.** *American Forests*, Wash., D. C., 60(8):8–12, 51–52, Aug. **1954.** photos. **DWB**—The drought situation and wind erosion problem of the southern Great Plains States and especially of southeastern Colorado is sized up in picture and text

with quotations from several local authorities. *Subject Headings:* **1. Drought 2. Wind erosion 3. Great Plains 4. Colorado.**—*G.T.*

6.4–293 551.577.38:551.579.5

Mitosek, Henryk, **Zasoby wilgotnósci gleby w okresie suszy 1951 roku w porównaniu z uvilgotnieniem w latach 1949 i 1950.** [Soil moisture during the drought of 1951 in comparison with the moisture efficiency of 1949–1950.] *Przegląd Meteorologiczny i Hydrologiczny*, 5(3/4): 72–96, **1952.** 10 figs., 3 tables, 6 refs. English summary p. 87. **DWB**—Results of a survey of effects of the great drought in the summer and fall 1951 in the eastern part of Poland and particularly in the province of Lublin carried out intensively at four stations of the affected area (Pulawy, Pózóg, Slawin and Czechnica) are presented, discussed and compared with the moisture of 1949, 1950. Records show that precipitation amounted only to 14, 6 and 5% of normal. Rainfall deficiency affected the soil, the cultivation of fields and the crop. Tables and graphs showing precipitation amounts, temperature curves, soil moisture at different depths, ground water levels, etc. complete the paper. *Subject Headings:* **1. Drought, Poland (1951) 2. Drought effects 3. Soil moisture deficiency 4. Eastern Poland.**—*A.M.P.*

6.4–294 551.577.5:551.515.2(521.73)

Kanaya, K., **A statistical study of rainfall caused by typhoon in Kobe area.** *Journal of Meteorological Research*, Tokyo, 4(9):621–626, Feb. **1953.** 8 figs. In Japanese; English summary in abstract section p. 39. **MH-BH**—The author develops an objective method of forecasting precipitation caused by typhoon in the Kobe area. It is found that 1) The distribution function of typhoons approaching the area within 300 km radius from Kobe is of Poisson's type, which makes it possible to calculate the probability that typhoons will cross the Kobe area in the coming year. 2) Heavy rainfall caused by typhoon occurs when a cyclone, front or trough induced by typhoon passes by the Kobe area. *Subject Headings:* **1. Typhoon rainfall 2. Typhoon forecasting 3. Statistical studies 4. Kobe, Japan.**—*Author's abstract.*

6.4–295 551.577.51:551.509.54

Nakayama, A., **On the so-called secondary orographic frontal rainfall.** (Pt. 1–2.) *Journal of Meteorological Research*, Tokyo, 4(11):913 923, Feb. **1953;** Pt. 3, *Ibid.*, 4(12):975–979, March **1953.** 15+8 figs., 5 tables, 12+7 refs., 8+5 eqs. In Japanese; English summary in abstract section, p. 56–57, 60. **MH-BH**—Examples of distribution of precipitation with approach of fronts to mountain range in Shizuoka are discussed from hourly records. With a southerly unstable current heavy rain may fall in lower Ôi River; synoptic analysis shows that this is due to secondary orographic fronts. With a strong N wind a shearing wave occurs near Ôi River. The heavy rain is attributed to the advance of a cold air mass. *Subject Headings:* **1. Orographic rainfall 2. Rainfall forecasting 3. Japan.**—*C.E.P.B.*

6.4–296 551.577.52

*Kittredge, Joseph (*Prof. Forestry & Forest Ecologist, Experiment Sta., Berkeley*), **Influences of forests on snow in the Ponderosa-sugar pine-fir zone of the Central Sierra Nevada.** *Hilgardia*, Berkeley, Calif., 22(1):1–96, March **1953.** 92 figs., 31 tables, 43 refs. **DWB, DLC**—This study aims at determining the sizes and densities of forests that are most effective in favoring the accumulation of snow, in minimizing losses by evaporation and in retarding and prolonging the melting period. The observations which comprise more than 20,000 records were made from Dec. to May or June for seven seasons (1934–38 and 1940–41) in the Stanislaus National Forest. Snow samples were taken at 100 stations equipped with composition boards, which were supplemented with 8-inch rain gages without funnels in each of the ten different cover types. Evaporation was measured by means of aluminum pans. The data are presented by means of graphs, tables and regression equations. The data cover density of snow, snow accumulation, interception, total snow on the ground, depth of snow density of total snow, water equivalent of total snow on the ground, evaporation from snow, duration and disappearance of snow cover and melting of snow. The suggestion, obtained from these studies, for improving the amount and timing of the yields of water from snow are outlined.

Subject Headings: **1. Forest influences 2. Snow data 3. Snow melt 4. Ponderosa pine 5. Central Sierra Nevada, Calif.**—*I.L.D.*

6.4–297 551.577.61:656.2

Katsui, T., **Railway accident and weather.** *Journal of Meteorological Research*, Tokyo 4(9):715-721, Feb. 1953. 12 tables. In Japanese; English summary in abstract section p. 44. **MH-BH**—A total of 128 accidents occurred due to bad weather during the 3-year period 1948–1951. The major cause was heavy rainfall, which was responsible for 60% of all accidents. Accidents occur when it rains more than 150 mm per day. With rainfall between 100 to 150 mm per day, accidents are apt to occur in Kansai district on all lines except those of Tōkaido and Sanyō. Precipitation between 50 and 100 mm may cause accidents occasionally on the Jyōtō and Katamachi lines and the western part of the Kanasai line. *Subject Headings* **1. Precipitation effects 2. Railway accidents.**—*Author's abstract.*

6.4–298 551.577.61:551.577.3

Kidson, C., **The Exmoor storm of Aug. 15, 1952.** *Geography*, Sheffield, 38(1):1–9, 1953 Also: Gifford, J., **Landslides on Exmoor caused by the storm of 15th August.** *Ibid.*, p. 9–17 6 figs., photos. **DLC**—I. Describes rainfall, Lynmouth stream system and floods. Death roll 28, great damage especially at Lynmouth. Rate of flow calculated as 18,400 cusecs over some hours; West Lyn changed its course. II. Described stripping of vegetation and soil from hillsides, mostly by slipping off a lubricated rock sub-surface, some slides by a deep flow of saturated material. *Subject Headings:* **1. Excessive rainfall 2. Flood damage.**—*C.E.P.B.*

SNOW

See: **Snow observ. program** (Butson), 6.4–27; **Snow** (Am. Geoph. Union), 6.4–28; **Convective heat transfer** (SIPRE), 6.4-140; **Vertical temp. gradient** (Gabilly), 6.4–214; **Eddies** (Lawrence), 6.4–233; **Snow crystal shape** (Kozima), 6.4–259.

HYDROMETEOROLOGY

See: **Physics of soil moisture** (A.G.U.), 6.4–26; **Soil moisture determ.** (Olson, Hoover), 6.4–29; **Measurm. of soil water . . .** (Richards), 6.4–30; **Measurm. of atmos. precipitation** (Bac), 6.4–65; **Expanding ice sheet** (Monfore, Taylor), 6.4–222; **Methane and pressure variations** (Tunzaad), 6.4–225; **Wind influence on water** (Bergstein), 6.4–239; **Hydroclimatic maps** (Ostromecky), 6.4–253; **Water evaporation** (Smolik), 6.4-257; **Water discharge** (Bratranek), 6.4–279; **Drought and agric.** (Havens), 6.4–284; **Drought** (Kitasawa, Kobayashi), 6.4–285; **Drought** (Lambor), 6.4–291; **Soil moisture** (Mitosek), 6.4–293.

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATE OF PARTICULAR PLACES

See also: **Climate of continents** (Kendrew), 6.4–1; **Meteorology** (Smoraski), 6.4–9.

6.4–299 551.582.2:235(435.15

Lange, Richard, **Hamburger Sommer. Liegen die Sommerferien richtig?** [Summer in Hamburg. Are summer holidays correctly timed?] *Annalen der Meteorologie*, 6(3/4):85–9, **1953/4.** 7 figs. German and English summaries p. 85. **MH-BH**—The daily mean values of sunshine, maximum and minimum temperature and rainfall at Hamburg in June through Sept. 1947, 1949 and 1951 are plotted and the days classified from holiday point of view as very good, good, moderate and bad. For 1933–52 the frequency of each class is shown for each half month for each year, and the total frequency for each class, smoothed over 34 days (the length of the holiday season) is shown for each day. The most favorable period is Aug. 4–Sept. 6, but the differences from one 34 day period to another are negligible compared with

differences from year to year. Also July has more "summer days" (over 25°C) than later periods. *Subject Headings:* **1. Climatic data 2. Hamburg, Germany.**—*C.E.P.B.*

6.4–300 551.582.2(57)

*Partanskiĭ, M. M., **Climatic conditions of the Russian part of Sakhalin Island.** Translation of his: **Klimaticheskie Usloviya Russkoĭ chasti O. Sakhalina,** by the Translation Branch Military Intelligence Service, W.D.G.S. Reproduced by Weather Division, Headquarters Army Air Forces, Jan. **1945.** 33 p. 15 tables, 6 refs. Declassified. Photostat of typescript. **DWB**—This is an English translation of the Original Russian work (*see* 4.1–213, Jan. 1953, *MAB*). Contains extensive tables of monthly and annual mean and extreme temperatures, precipitation, cloudiness, relative and absolute humidity, and number of days with various meteorological occurrences. In addition, frequencies of winds from various directions, temperature of various wind directions, soil temperature, snow depth, etc. (some for 60-day periods) for 5 or 10 years of record for 5 stations. *Subject Headings:* **1. Climate of Sakhalin Island, U.S.S.R. 2. Climatic data 3. Soil temperature data 4. Translations 5. Sakhalin Island, U.S.S.R.**—*M.R.*

6.4–301 551.582.2(569.4)

Rosenan, Naftali (*Asst. Dir., Israel Met. Ser.*), **Climate of the Southland.** Photostat, p. 25, of anonymous source. 2 photos, table. **DWB**—Brief discussion accompanied by tables of mean monthly temperature, relative humidity, rainfall and number of rainy days for Beersheba, Revivim, Sedom and Elath, with records ranging from 3 to 22 years in length. The climate is described for each of 4 regions: the Coastal Zone, the Negeb Plain, the Negeb Hills and the Arraba. At Elath the mean annual rainfall is only 0.76" and at Beersheba 8.94". *Subject Headings:* **1. Climate of Negeb, Israel 2. Negeb, Israel.**—*M.R.*

6.4–302 551.582.2(59)

*Sanderson, Robert W. (*U. S. Air Weather Serv., Wash., D. C.*), **Notes on the climate of Indochina.** *Weatherwise,* 7(3):56–59, 69, June **1954.** figs., photo. **MH-BH**—Salient points of the climate, especially with respect to military and air operations, are brought out in text. The record annual rainfall at Kas Kong of 313 in., the July and Aug. total of 131 in. at Dien Bien Phu (1937), the 115 in. at Latrong in Sept. 1930 and 28 in. in 24 hours at Hatien give some idea of the worst conditions to be encountered there. Charts show general winter and summer monsoon air flow over Indochina, mean seasonal precipitation for summer and winter and monthly course of temperature, precipitation and relative humidity for Hanoi. *Subject Headings:* **1. Climate of Indochina 2. Military climatology 3. Record rainfall 4. Indochina.**—*M.R.*

6.4–303 551.582.2(791)

†*U. S. Quartermaster Corps. Research and Development Division. Environmental Protection Branch, **Handbook of Yuma environment.** Its *Report,* No. 200, Feb. **1953.** 61 p. 33 figs., graphs, tables, maps, bibliog. p. 13. **DWB**—The climate, surface and terrain conditions and vegetation of Yuma Test Station (southwestern Arizona), an area available for research, development, engineering and user-test programs of the Dept. of the Army, are described in detail. This region is a desert area with half the days of the year having maximum temperatures of 90°F and nearly one third of the days with 100°F or over, and a mean annual rainfall of 3.38 in. Climatic data taken from Weather Bureau records are appended to the report. They include values of extreme temperature frequencies, temperature and precipitation regime, frequencies of thunderstorms, sky cover and precipitation, amount of sunshine, mean daily radiation, visibility, wind speed and direction, dust count, etc. Photographs of the test station and surrounding areas are presented. *Subject Headings:* **1. Climatic data 2. Extreme temperatures 3. Desert climates 4. Climate of Yuma, Arizona 5. Yuma, Arizona.**—*G.T.*

6.4–304 551.582.3(728.6)

*Costa Rica. Dirección General de Estadística y Censos, **Atlas estadístico de Costa Rica.** [Statistical atlas of Costa Rica.] San Jose, Costa Rica, **1953.** 114 p. tables, photos.,

charts, diagrs., foot-refs., maps (some colored). **DWB**—In this attractive atlas one finds o p. 12–13 and p. 34 a brief discussion of the climatic types and conditions in Central Americ in general and Costa Rica in particular; a colored isohyetal chart (range 200 mm to 760° m per year), and on p. 36 a number of graphs and histograms of mean and extreme temperatur and monthly precipitation at 10 stations in Costa Rica. On p. 37 there is a multi-colore climatic chart giving a rough idea of the conditions in the 10 climatic "zones" which are de picted. *Subject Headings:* **1. Climatic charts 2. Climate of Costa Rica 3. Costa Rica I. Wille Trejos, Emilio II. Archer, Alford.**—*M.R.*

6.4–305 551.582.3(485

Sweden. Generalstabens Litografiska Anstalts, Stockholm, **Information on Atlas o Sweden. An atlas of the nature, population and economy of Sweden** edited by the Svensk Sällskapet för Antropologi och Geografi. Stockholm, **1953.** 23 p. Sample pages of Atla folded in pocket.—Pre-publication announcement of a big atlas of Sweden which will includ a section on meteorology and hydrology (Section 2) with temperature and precipitation map (compiled from data covering the period 1900–1930), maps on frost, days with precipitatio pressure, hours of sunshine, lakes, watercourses, volume of water in rivers, freezing and thaw ing time of rivers and lakes. Information on subscription conditions is included. *Subje Headings:* **1. Atlases 2. Climatic charts 3. Hydrologic maps 4. Sweden. I. Svensk Sällskapet för Antropologi och Geografi.**—*G.T.*

6.4–306 551.582.3(26

Obsuzhdenie vtorogo toma Morskogo Atlasa. [Evaluation of volume two of the Marin Atlas.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 86(2):206–207, March/April **1954 DLC**—This is an account of a special meeting held by the Geographical Society of the U.S.S.R to evaluate the second volume (physical geography) of the Marine Atlas edited by I. S. Isakov V. V. Shuleĭkin and L. A. Demin. Vol. 2 contains 76 sheets, with 138 principal maps, 22 supplementary maps, 239 graphs and 24 pages of text. Its content by subject includes: Th most important marine voyages and expeditions; Oceanography and Climate of the Worl Ocean. (For review of vol. 1, *see* 3.9–206, Sept. 1952, *MAB.*) *Subject Headings:* **1. Marin atlases 2. Oceanographic expeditions 3. Oceanography.**—*I.L.D.*

6.4–307 551.582.3(73

U. S. Weather Bureau, **A proposal for a national climatological atlas.** Wash., D. C. Pub. by the Bureau, **1952.** 10 p. illus. Also: Idem, **A proposal for climatic atlases of th United States.** Wash., D. C. Pub. by the Bureau, **1951.** 8 p. illus. **DWB**—Agricultur commerce, construction, aviation, industry and a number of other professions depend o weather. "Climate is a statistical history of weather." These pamphlets show by simp examples how climatological information can be used in planning various activities. Purpose the publications is to demonstrate the importance of preparing climatological atlases fo public use. *Subject Headings:* **1. Climatic charts 2. Atlases 3. United States.**—*G.T.*

CLIMATIC VARIATIONS

See also: **Climatic change** (Erkamo), 6.4–34; **Severe winters** (Liljequist), 6.4–208.

6.4–308 551.583.2:551.311.1

Flint, Richard Foster (*Yale Univ.*), **Evidence from glacial geology as to climatic variation** (In: Shapley, Harlow (*ed.*), **Climatic change.** Cambridge, Harvard Univ. Press, **1953.** 165–178. 3 figs., 3 tables, 8 refs.) **DLC**—The author considers the following subject relationship between fluctuations of glaciers and sunspot number; the comparative extent of the four major glacial sheets in North America; the comparative extents of Wisconsi "Substage"; the thickness of the glacier ices; the centers of outflow of glacier ice; stratigraph of the Illinoian drift and of the Wisconsin drift, climatic variations during the Wisconsin ag as inferred from the glacial evidence; and comparison of the North American and Europea glacial sequences. Evidence is presented to indicate that a direct relation may exist betwee glacier and sunspot number, that the climatic controls of the origin and growth of glacie

were repeated during subsequent glaciations, that "local departures of drift-sheet borders from general parallelism imply local variations in snow supply and possibly therefore in the atmospheric circulation pattern" and that the close similarity of North American and European events during the Wisconsin (Fourth) glacial age suggests that climatic variations during that age were contemporaneous on both sides of the Atlantic. *Subject Headings:* **1. Climatic changes 2. Glaciation 3. Sunspot numbers.**—*I.L.D.*

6.4–309 551.583.2:551.311.12

Hack, John T. (*U. S. Geological Survey*), **Geologic evidence of late pleistocene climates.** (In: Shapley, Harlow (*ed.*), **Climatic change.** Cambridge, Harvard Univ. Press, **1953.** p. 179–188. 3 figs., 28 refs.) **DLC**—A critical review of Büdel, J., **Die raümliche und Zeitliche Gliederung des Eiszeitklimas** from *Naturwissenschaften*, 36:105–112 and 133–139, 1949, which summarized the date on the climate of Europe during the Würm maximum and "presents a map of Europe for this period showing five climatic geomorphic provinces north of the temperature forest border." BÜDEL's basic concept is that the climatic fluctuations during the cold period of the Pleistocene shifted the climatic zones equatorward but that their boundaries remained essentially parallel to those of to-day. BÜDEL's ideas that the deposition of loess in Western Europe was favored by a particular climatic environment and that it is mostly of eolian origin and his postulate of a sudden change of climate, cold-dry to warm-moist which caused the retreat of ice and cessation of loess deposition are examined critically. *Subject Headings:* **1. Climatic changes 2. Pleistocene period 3. Loess 4. Europe.**—*I.L.D.*

6.4–310 551.583.2:551.311.12:631.48(4)

†Lais, Robert, **Über den jüngeren Löss in Niederösterreich, Mähren und Böhmen.** [The newer loess in lower Austria, Moravia and Bohemia.] *Naturforschende Gesellschaft zu Freiburg im Breisgau, Berichte*, 41(2):119–178, Dec. **1951.** tables, 10 plates, bibliog. p. 166–168. **DLC**—Discussion of climatic conditions for the formation of soils and a detailed study of soil profiles and their explanation by climatic changes during the Würm glacial periods. Loess is formed during glacial periods, black soil during interglacial periods with continental dry climate, brown soil during interglacial periods with abundant precipitation. *Subject Headings:* **1. Loess 2. Climatic changes 3. Glacial periods 4. Soil formation 5. Central Europe.**—*A.A.*

6.4–311 551.583.2(42)

Manley, Gordon, **A prospect of winter.** *Weather*, 8(12):357–360, Dec. **1953.** plate, 2 refs. **MH-BH**—Discussion of auguries of a severe winter in Britain. The great frosts of 1683–84 and 1740 both opened with strong very cold NE winds due to a "blocking high" over Scandinavia. *Subject Headings:* **1. Historical climates 2. British Isles.**—*C.E.P.B.*

6.4–312 551.583.2(569)

Shalem, N., **La stabilité du climat en Palestine.** [Stability of climate in Palestine.] (In: International Symposium on Desert Research, Jerusalem, May 7–14, 1942, **Proceedings,** pub. **1953.** p. 153–175. 8 refs.) **GB-MO**—A great deal of literary evidence, mainly Biblical, some Byzantine, is quoted to show that the climate of Palestine has not changed since 1000 B. C. Changes of hydrography, crops and population were due to political, not climatic, causes. Place names after native flora and fauna also prove stability of climate. *Subject Headings:* **1. Historical climates 2. Palestine.**—*C.E.P.B.*

6.4–313 551.583.2:551.311.12

Streiff-Becker, R., **Gletscherschwund.** [Glacier disappearance.] *Leben und Umwelt*, 10(9):199–202, June **1954.** 2 figs. **DLC**—Glacier retreat is due to higher temperature and decreased precipitation. On Clariden firn 1916–1920 an excess of firn firmation at 2900 m of over 3.5 m at density 0.5 did not suffice to maintain the glacier, which began to retreat in 1921. A succession of damp cold summers giving excess firn formation of over 4 m would be needed to cause readvance. *Subject Heading:* **1. Glacier fluctuations.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Micromet. data** (Gerhardt), 6.4–46; **Radiation regime** (Smirnov), 6.4–176; **Distribution of light** (Trojer), 6.4–179; **Turbulent exchange investig.** (Shcherbakova), 6.4–237.

6.4–314 551.584.4

*Skvortsov, Anatoliĭ Alekseevich, **K voprosu o vliianii rastitel'nosti na klimat i pochvu. Sur la question de l'influence de la vegetation sur le climat et le sol.** [Influence of végétation on climate and soil.] Tashkent, **1925.** 16 p. 11 tables. French summary following p. 16. **DLC**—In connection with 15 years of research in Turkestan on the influence of vegetative cover on microclimatic conditions for crops, an intensive program of soil and air temperature and humidity observations was carried out from May to Nov. 1924 in Turkestan. Extensive tables of comparative data are presented (soil temperature, etc. in various types of cover) showing that the desert climate does not exist in the oasis, but rather a temperate, humid climate, since temperatures may be 12°C lower on a hot day and relative humidities 64% higher than over the barren desert soil. The author calls this the "active layer" or "active zone." *Subject Headings:* **1. Vegetation influences 2. Oases 3. Soil temperatures 4. Turkestan, U.S.S.R.**—*M.R.*

6.4–315 551.584.6:551.571.3:551.524.3

Akedo, K., **Meteorological research of Hre Shōsoin.** *Journal of Meteorological Research,* 3(6):199–206, March **1951.** 14 figs., table. In Japanese; English summary in abstract section, p. 13. **DWB**—Thermographs and hygrographs are placed in wooden boxes and in wooden buildings ("Arekura" type) and temperature and humidity variations were compared with those in the open air. The degree of metallic corrosion was examined. *Subject Headings:* **1. Building climates 2. Temperature variations 3. Humidity variations 4. Shōsoin, Japan.** —*From author's abstract.*

6.4–316 551.584.6:551.571.31:551.524.31

Kitamura, K., **On the humidity-fixing effect of wood. Pt. 1, A report of Shōsoin observation.** *Journal of Meteorological Research,* 3(6):220–224, March **1951.** 2 figs., 2 tables. In Japanese, English summary in abstract section, p. 14. **DWB**—The diurnal variations of humidity, temperature and vapor pressure in a wooden box were recorded and compared with corresponding variations in the open air. It was found that the variations of temperature fulfilled the equations of heat conduction, the humidity was damped in amplitude but the vapor pressure in the box was 4.6 times that in the open air. It is concluded that the vapor pressure in the box is affected by the water contained in the wood. An experiment to test this hypothesis is described. *Subject Headings:* **1. Microclimates 2. Humidity variations 3. Temperature variations 4. Japan.**—*I.L.D.*

BIOCLIMATOLOGY

See also: Cold injury (N. Y. Conference on Cold Injury), 6.4–5; **Phenological observations** (Zerinvari), 6.4–43.

6.4–317 551.586:612:628.8

Ellis, F. P., **Tolerable and desirable levels of warmth in warm climates, with special reference to the requirements of men in the Royal Navy.** *London. Royal College of Surgeons of England, Annals,* 13:369–391, **1953.** 6 figs., 4 tables, 49 refs. **DSG**—Previous investigations on effect of high temperatures are summarized, including effects of heat acclimatization. The effective thermal environment, corrected for radiant warmth, was measured in different positions in ships in the tropics; in several places it exceeded 86°F, previously considered as the limit for effective working, by several degrees. Experiments with polished and matt black "model men" are described. In Singapore the most "comfortable" condition for Europeans was an effective temperature of 76–78°F. Comfort zones for different parts of the world are shown in a diagram. Ventilation standards based on comfort criteria are essential for efficiency. Upper tolerable levels for young Europeans wearing overalls or shorts are tabulated. The upper "tolerable" effective temperature is confirmed as 86°F but the upper "desirable"

level is set at 78°F. *Subject Headings:* **1. Acclimatization 2. Comfort zones 3. Air conditioning 4. Tropics.**—*C.E.P.B.*

6.4–318 551.586:612

Fahnestock, M. K.; Heckel, E. P.; Glickman, Nathaniel and Inouye, Tohru, **Controlling the environment.** *Heating, Piping and Air-Conditioning*, 25(1):123–127, Jan. **1953.** 3 figs. **DWB**—Experimental investigation of the effect of environmental factor upon healthy and sick individuals, currently conducted at the Univ. of Illinois, College of Medicine, is reported in detail. The installation, consisting of 8 special environment mental rooms with their adjoining equipment rooms, two instrument rooms, an examining room and an isolation room, is described. Plans of the installation are given in drawings. Equipment of each room is specified. *Subject Headings:* **1. Medical climatology 2. Environment control 3. Mental hygiene.**—*G.T.*

6.4–319 551.586:612

Ladell, W. S. S., **The myth about the tropics.** Reproduced from the UNESCO Courier. [n.d.] 2 p. Mimeo. **DWB**—Notes on living in the tropics, with the main thesis being the necessity of regular activity and exercise rather than the traditional lassitude and excessive drinking of alcoholic beverages. Water and salt are two necessary items in the diet of white men in the tropics. Overheating, not work, is the thing to avoid. Men have sweat glands and can keep cool when active, unlike cattle which must rest for a good part of the day in hot weather. *Subject Headings:* **1. Acclimatization 2. Tropical environment 3. Heat tolerance.**—*M.R.*

6.4–320 551.586:612

Ladell, W. S. S. (*Lagos, Nigeria, Hot Climate Physiological Res. Unit*), **The physiology of life and work in high ambient temperatures.** *Research Council of Israel, Special Publication*, No. 2:187–204, **1953.** 32 refs. Reprint from International Symposium on Desert Research, Jerusalem, May 7–14, 1952, **Proceedings. DWB**—The literature on the problem of man's adaptation to hot climates, especially with reference to the development of civilization and the physiological studies on the effect of heat upon the human are reviewed briefly. Then the present knowledge on the effect of high ambient temperatures and humidities upon physiological reactions of human beings is summarized. *Subject Headings:* **1. Acclimatization 2. Physiological climatology 3. Heat tolerance.**—*I.L.D.*

6.4–321 551.586:612

Lange, R., **Der Klimafaktor Schwüle.** [The climatic factor, sultriness.] *Hamburg. Seewetteramt, Die Witterung in Übersee*, 1(11):1–3, Nov. **1953.** 5 figs., 6 refs. **MH-BH**—Maps showing the distribution of sultriness in Africa during Jan. and July on the basis of G. SCHMID's concept that sultriness manifests itself when the cooling power of evaporation from the skin is less than 10 mg cal/sq cm/sec. The author discusses the role of evaporation in cooling and the various sultriness boundaries established by various investigators. *Subject Headings:* **1. Sultriness 2. Cooling power 3. Africa.**—*I.L.D.*

6.4–322 551.586:612

Malovčak, P., **Temperatura zraka i toplinski osjet ljudskog organizma.** [Atmospheric temperature and heat sensation of the human body.] *Yugoslavia. Hidrometeorološka Služba, Vesnik* (1/2):36–38, Jan./June **1954.** table, eq. **DWB**—On two successive days with unusually warm temperatures (May 25 and 26, 1953), the writer and other individuals observed a contradiction between their own heat sensations and objective data. The second day was unanimously sensed as cooler although it should have felt warmer according to HILL's formula of sensible temperature. Author attributes this discrepancy to the fact that HILL considered only atmospheric temperature, wind and humidity, and disregarded radiation as a factor in human heat sensation. Other factors, like acclimatization, etc., are mentioned. *Subject Heading:* **1. Sensible temperature.**—*G.T.*

6.4–323 551.586:612

*Mátyus, József Sz., **Magyarország éghajlatának fülledtségi viszonyairól.** [Sultriness conditions in the climate of Hungary.] *Időjárás*, 57(2):90–97, March/April **1953.** 3 figs.,

tables, 7 refs. Russian and French summaries p. 90. **DLC**—Data on daily, monthly and annual frequency distribution of different degrees of sultriness are presented for Budapest in 10-year averages (1924–1933). Conditions in Budapest are compared with those at other stations in Hungary. The average number of sultry hours in Hungary is 120–300. The lowest value of sultriness considered is determined by the formula $p = 28.2 - (t/2)$, where p = vapor pressure in mm and t is the air temperature in °C. *Subject Headings:* **1. Sultriness 2. Hungary.**—*G.T.*

6.4–324 551.586:612:72

Olgyay, Victor (*M.I.T.*), **Bioclimatic approach to architecture.** *National Research Council, Wash., D. C. Building Research Advisory Board, Housing and building in hot-humid and hot-dry climates, Nov.* 18–19, 1952, *Proceedings*, pub. 1953. p. 13–23, figs. **DWB**—The author discusses the interactions of the meteorological variables—temperature, humidity, wind velocity and radiation, the various comfort zones established for temperate climate inhabitants (ASHVE, etc.), and the effect of air movement upon temperature and atmospheric vapor pressure, the effect of evaporative cooling upon high temperature and radiation upon dry bulb temperature. The effects of these climatic elements (which are shown graphically) are combined to form a bioclimatic chart on which the comfort zone lies in the middle and "from its perimeter the effects of the climatic elements are indicated in scale of their amounts needed to receive the comfort feeling on other temperatures." The climatic analysis and evolution of needs with the aid of the bioclimatic chart and its application in architecture is shown. *Subject Headings:* **1. Architectural climatology 2. Indoor climates 3. Bioclimatic charts 4. Comfort zones.**—*I.L.D.*

6.4–325 551.586:612:551.590.21

Reissmann, Kurt R.; Buettner, Konrad and Topka, Elaine A., **Influence of solar activity, especially at high altitudes, on the TAKATA-flocculation-reaction in serum of normal persons.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(1):103–111, **1953.** 3 figs., table, 14 refs. English, German and French summaries p. 103–104. **MH-BH**—Authors repeated S. TAKATA's 1949 experiments on flocculation reactions, subjects being 4 normal healthy men at San Antonio, Texas. In contrast to TAKATA's results they found no correlation with sunspot activity, no day-night rhythm and no change during flights up to 30,000 ft. *Subject Headings:* **1. Takata reaction 2. Solar influences.**—*C.E.P.B.*

6.4–326 551.586:612:551.508.98

Stoll, Alice M. and Hardy, James D., **Direct experimental comparison of several surface temperature measuring devices.** *Review of Scientific Instruments*, 20(9):678–686, Sept. 1949. 4 figs., 4 tables, 13 refs. **DLC**—Several types of existing instruments used in measurement of heat loss from the body (skin temperature) were tested under comparable conditions. The radiometric type of skin thermometer was considered better than the others. *Subject Headings:* **1. Skin temperatures 2. Katathermometers.**—*W.N.*

6.4–327 551.586:612

Weather observers looking farther ahead. *Junior Review*, Wash., D. C., 25(13):1,8, Dec. 8, **1952.** illus. **DWB**—Article on the effect of weather upon human activities and on the importance of weather forecasting and eventual weather control. U. S. Weather Bureau activities, including upper air observation and investigation of jet stream, are discussed. A schematic drawing of cloud seeding is presented and commented on. *Subject Headings:* **1. Physiological climatology 2. Weather control 3. U. S. Weather Bureau.**—*G.T.*

6.4–328 551.586:728(73)

Colean, Miles. **A magazine does something about the weather.** *Weatherwise*, 6(2):44–45, 62, April **1953.** **MH-BH**—The effort made by the **House Beautiful** magazine to make builders and architects aware of the uses to which climatic data can be put and to make climatologists or meteorologists present data in a way which is more directly applicable to design problems is summarized and illustrated in this short article. General climatic charts for the U.S.A. proved useless, so analysis and presentation of data was put on the basis of large population centers (15 in all) and the area within a radius of 200 miles of each center. Temperature

variations (dry and wet bulb) by months, solar radiation and wind, precipitation and humidity (including snow) hourly values, frequencies and duration of extremes comprise the basic data summarized and portrayed in this series. *Subject Headings:* **1. Applied climatology 2. Building design.**—*M.R.*

SYNOPTIC CLIMATOLOGY

See also: **Clouds and winds** (Häfelin), 6.4–4; **Weather types** (van der Ham), 6.4–155; **Pressure and weather distribution** (van der Ham), 6.4–161; **Solar radiation on slopes** (Gordov), 6.4–178; **Fog drop size distrib.** (Kozima, others), 6.4–260.

6.4–329 551.589.1

Pédelaborde, Pierre, **Un example de circulation atmosphérique régionale. La circulation sur l'Europe occidentale.** [An example of regional atmospheric circulation. Circulation of western Europe.] *Annales de Géographie*, Paris, 62(334):401–417, Nov./Dec. **1953.** 4 figs., refs. **DWB**—The climate of western Europe is described in terms of the frequency of certain types of circulation, air masses, etc. (based on French school). This synoptic climatology is illustrated by numerous charts showing the mechanism of the air flow over France and vicinity under different situations. The details of the weather during the occurrence of each type are given (i.e. dust from the Sahara and high temperature and humidity during SE type). The most frequent type is the "cyclone from the west" which occurs 31% of the time (based on records for Paris 1921–1951) and the second most frequent is the "continental anticyclone" with 28% frequency. *Subject Headings:* **1. Synoptic climatology 2. Circulation types 3. France 4. Western Europe.**—*M.R.*

6.4–330 551.589.5 551.524.36

*Sapozhnikova, Serafima Afanas'eva, **Opyt ispol'zovaniia ul'trakorotkikh riadov nabliudenii i postroeniia kart bol'shogo masshtaba.** [Experiment on the use of ultra-short series of observation and compilation of large scale maps.] (In: Leningrad, Agrogidrometeorologicheskiĭ Institut, **Materialy po agroklimaticheskomu raionirovaniiu subtropikov SSSR.** Leningrad, Gidrometizdat., 2:98–111, **1938.** 6 figs., 9 tables, map (fold.).) **DLC**—Data obtained by a microclimatic survey, which was carried out during the winter of 1934–1935 in the subtropic region, were used in this research on methods for the reduction of ultra-short series of observations to the normals, and estimation of climatic conditions of relatively large surfaces by means of observations made at single points, which is very hard to do for regions with varied relief. The author analyzed the differences in lowest temperatures between the stations situated in different relief conditions during clear and cloudy weather. Considering the frequency of clear and cloudy weather, and the mean differences of lowest temperature by months, taken separately for clear and cloudy days, a formula of reduction of the mean values of annual lowest temperatures has been derived. For better approximation, the wind velocity is also taken into account. A table shows how the differences of lowest temperatures observed in cloudy weather vary with different wind velocity. Relations between the mean value of lowest temperature and the frequency of days with lowest temperature −5°C are shown on a graph. Methods used for the compilation of the map showing the distribution of annual mean values of lowest temperatures for the state's plantation "Il'ich" are explained in detail and the zones of different rate of frost danger are outlined. *Subject Headings:* **1. Statistical methods in climatology 2. Temperature extremes 3. Subtropic zone, U.S.S.R.**—*N.A.S.*

MISCELLANEOUS

OPTICAL PHENOMENA

See also: **Radio-sonde ascents** (Taylor), 6.4–77; **Smoke haze** (Hurst), 6.4–107; **Solar influences** (Reissmann, others), 6.4–325.

6.4–331 551.593.1

Abnormal refraction. *Marine Observer*, 24(166):208–210, Oct. **1954.** 10 figs. **MH-BH**—Dec. 21, 1953, Bass Strait, vertical elongation and inverted image of steamer distant 17–5½

miles. Dec. 2, 1953, abnormal refraction of South Australian coast. Nov. 5, double sun a sunrise, Japanese waters. Dec. 23, N. Atlantic, distortion and color changes of rising moon *Subject Headings:* **1. Abnormal refraction 2. Mirages.**—*C.E.P.B.*

6.4–332 551.593.12

Ellison, M. A., **Stellar scintillation: a problem in astronomy and meteorology.** *Weather* 8(1):21–22, Jan. **1953. MH-BH**—Summary of lecture. Records of stellar and planetary scintillation by cathode-ray oscillograms are described and theories of scintillation discussed *Subject Heading:* **1. Scintillation.**—*C.E.P.B.*

6.4–333 551.593.12

Ellison, M. A., **Why do stars twinkle?** *Royal Astronomical Society of Canada, Journal* 46(5):191–194, Sept./Oct. **1952.** Reprinted from *Irish Astronomical Journal*, 2:5, Jan. **1952 DWB**—After a brief elementary explanation of the scintillation of stars and an account o various interpretations of the phenomenon throughout history, the author reports on the construction of electronic equipment capable of recording light flashes at a rate of about 10,000 per sec. The telescope combined with a photoelectric cell, amplifier and film recorder, ha been developed by the author in collaboration with H. Seddon at the Royal Observatory Edinburgh. Among other results obtained with the apparatus it was possible to determine "the average size of the atmospheric irregularities causing scintillation (about 3 in.) and thei average height (about 8000 ft)." *Subject Headings:* **1. Scintillation 2. Electronic recorders.**— *G.T.*

6.4–334 551.593.12:551.524

Krasil'nikov, V. A. and Tatarskiĭ, V. I., **O zavisimosti srednego kvadratichnogo fluktuatsi fazy i amplitudy ot razmerov ob'ektiva pri nabliudenii mertsaniia zvezd.** [Dependence of the standard deviation of phase and amplitude fluctuations on the dimensions of objective observing of the scintillation of stars.] *Akademiia Nauk SSSR, Doklady*, 88(3):435–438, Jan. 21, **1953** 3 figs., 5 refs., 20 eqs. **DLC**—Theoretical study on the decrease of scintillations of stars with increasing diameter of the objective, taking into account the temperature fluctuations in the turbulent atmosphere and assuming that $f(\rho/l)=\overline{T}^2 e^{-(\rho/D)^2}$; $f(\rho/l)$ = correlation function ρ = distance, l = scale of turbulence (~1 cm), T = absolute temperature. *Subject Headings* **1. Scintillation 2. Temperature fluctuations.**—*A.A.*

6.4–335 551.593.5

Sekihara, Kyo, **Primary and secondary scattering of sunlight in a plane-stratified at mosphere which contains an absorption layer.** *Tateno, Japan. Aerological Observatory Journal*, 5(2):158–166, Jan. **1953.** 4 figs., 9 eqs. In Japanese; English summary p. 156 **DWB**—Theoretical formulas are deduced for both primary and secondary scattered sunligh in the case of (1) a thin absorption layer with given absorption coefficient and optical level and (2) an absorption layer of finite thickness extending uniformly between two optical levels and having a given absorption coefficient. For the latter case the scattered intensities are ex pressed above, in and below the absorption layer. *Subject Headings:* **1. Scattering of ligh 2. Atmospheric absorption.**—*From author's abstract.*

ELECTRICAL PHENOMENA

See also: **Charging of atmos. droplets** (Gunn), 6.4–7; **Lightning streamers** (Hewitt), 6.4–78; **High level wind** (Crary), 6.4–215; **Atmospheric winds** (Kennedy), 6.4–216.

6.4–336 551.594.1

*Argentina. Servicio Meteorológico Nacional, **Resumen y analysis de observaciones de electricidad atmosférica (Pilar) anos 1937–1950.** [Résumé and analysis of observations o atmospheric electricity at Pilar, 1937–1950.] Its *Series B, Section 2, Part 3*, No. 2, **1953** unpaged. numerous tables and graphs. **DWB**—A continuation of data summary for 1924–3((*see* 5.1–306, Jan. 1954, *MAB*). Diurnal and seasonal variations in atmospheric potentia gradient are tabulated and plotted on graphs and related to wind, precipitation, etc. *Subjec*

Headings: **1. Magnetic observatories 2. Atmospheric potential gradient data 3. Ionization data 4. Pilar Geophysical Observatory, Córdoba, Argentina 5. Córdoba, Argentina.**—*M.R.*

6.4–337 551.594:629.13

Cornell Aeronautical Laboratory, Inc., **Investigation of means to maintain zero electrical charge on aircraft.** Contract AF 19(122)-475, Interim Report, No. RA-766-P-4, Feb. 1–May 1, **1952.** 14 p. 18 figs. (some fold.), 2 refs. Also: Interim Report No. RA-766-P-8, Feb. 1–June 30, **1953.** 16 p. 7 figs. **DWB;** Also: Interim Report No. RA-766-P-9, July 1–Oct. 31, **1953.** 3 p. **MH-BH**—(1) Details for equipment detecting charge on the aircraft and discharging a current proportional to the charge are described with numerous circuit diagrams. (2) The Air Force Cambridge Research Center authorized the Cornell Aeronautical Laboratory, Inc. to develop a system for maintaining zero electrical charge on aircraft. The system which is described has been designed, fabricated, installed in B29 No. 461742 and a preliminary flight test made 11 June 1953. The system operated satisfactorily and provided rapid control of the aircraft potential. Although several hours of test had been planned, the high voltage supply became inoperative after 20 minutes of flight. While the 20 minutes of data cannot be considered as proving the feasibility of the operation of the system under all conditions, they demonstrate that the system behaved as intended in its design until the high voltage supply failed. (3) During the reported period (July 1–Oct. 31, 1953) primary effort was on flight data analysis and preparation of the final report. The project was terminated Oct. 31, 1953. *Subject Headings:* **1. Electrical charges on aircraft 2. Aeronautical meteorology 3. Atmospheric electricity 4. Flight data analysis. I. Hendrick, R. W. II. Pelton, Frank M.**—*A.A., Author's abstract.*

6.4–338 551.594.1/3:550.37

Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y., **Study of the earth's electric field.** Contract AF 19(122)-467, Quarterly Report, No. 2, Aug. 1–Nov. 1, **1951.** 8 p. 4 figs., ref.; Quarterly Report, No. 5, May 1–Aug. 1, **1952.** 7 p. figs., refs.; Quarterly Report, No. 8, Feb. 1–April 30, **1953.** 9 p. 3 figs. **DWB**—(1) The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. This is a technical report on preparation for the measurement of the earth's electric field, both polarities of air conductivity and the comparison of the values obtained with meteorological phenomena. No data. (2) Operational progress during the period of this report is outlined and data collections are summarized. Sample potential gradient records for clear weather, distant thunderstorms and local thunderstorms are presented with discussion of the diagnostic possibilities of gradient changes; and of the data needs for further clarification of the relations between weather changes and field changes. (3) Present project effort is largely in the instrumentation phase, with emphasis on establishing reliable automatic recording of field and conductivity fluctuations. Continuous records are being obtained for the electric field, barometric pressure, temperature, humidity, solar radiation intensity, and Geiger background. Equipment is nearly complete for recording atmospheric conductivity and precipitation. *Subject Headings:* **1. Terrestrial electricity 2. Electrical conductivity of air 3. Potential gradient 4. Thunderstorm electricity 5. Magnetic field changes 6. Atmospheric electricity measurements. I. Ives, Ronald L. II. Garber, David H.**—*Author's abstract.*

6.4–339 551.594.51

§Bennett, W. H. and Hulburt, E. O., **Magnetic self-focussed solar ion streams as the cause of aurorae.** *Journal of Atmospheric and Terrestrial Physics*, 5(4):211–218, Sept. **1954.** 4 tables, 21 refs., 7 eqs. Also their: **Theory of the aurora based on magnetic self-focusing of solar ion streams.** *Physical Review*, 95(2):315–319, July 15, **1954.** 3 tables, 15 refs. **DWB**—It is assumed that in a jet of equal numbers of fast positive ions and negative electrons passing through the corona the fast electrons are scattered out and replaced by slow electrons. The field of the resulting current repels fast electrons and slow ions. Density of a stream sufficient to cause aurora is calculated as at least 10^{-4} electron-ion pairs per cc to support this magnetic self-focusing. Speed of auroral ions estimated as 10^{10} cm/sec. Aurora is attributed to energy transferred from ions to atmosphere and to atmospheric O and N particles blown outwards

and made luminous. Article in **Journal of Atmospheric and Terrestrial Physics** is a slightly revised version of that appearing in **Physical Review.** *Subject Heading:* **1. Auroral physics.**—*C.E.P.B.*

6.4–340 551.594.7:550.3

Budden, K. G. (*Cavendish Lab., Cambridge*), **The propagation of a radio atmospheric Pt. 2.** *Philosophical Magazine*, London, 7th Ser., 43(346):1179–1200, Nov. **1952.** 6 figs. 15 refs. **DWB**—The present paper gives the full mathematical theory, and shows how the characteristics of the wave-guide modes may be determined in the most general case, provided that the reflecting properties of the earth and the ionosphere are known as functions of the angle of incidence which is, in general, complex. It is found that the wave-guide modes are of two types, which are described as "quasi-transverse magnetic" and "quasi-transverse electric." Allowance can be made for the curvature of the earth. A particular case is then discussed, in which the surface of the earth is assumed to be perfectly conducting, and the ionosphere is assumed to be a homogeneous ionized medium, with the steady magnetic field of the earth superimposed. The results of numerical calculations are given, for a few special cases, in the form of curves. These show (i) the attenuation in the various modes as a function of frequency, (ii) the polarization characteristics of the wave in typical modes and (iii) the amplitudes of the wave which are excited in typical modes by a vertical electric dipole source. (For Pt. 1, *see* 4K–231, Nov. 1953, *MAB.*) *Subject Headings:* **1. Radio propagation 2. Terrestrial magnetism 3. Sferics propagation.**—*From author's abstract.*

6.4–341 551.594.7:538.55

Dieminger, W., **Ein neuer Ausbreitungsweg für Ultrakurzwellen über grosse Entfernungen.** [A new way of transmitting ultra-short waves to great distances.] *Umschau* 54(4):118–119, Feb. 15, **1954. DWB**—Range of ultra-short waves is increased about ½ by refraction which varies with pressure, temperature and water content in lower atmosphere. Very abnormal ranges are due to reflection at ionosphere. This has been achieved regularly (up to 2000 km) in America by a special technique; the cause is discussed. *Subject Heading* **1. Microwave propagation.**—*C.E.P.B.*

6.4–342 551.594.7:551.15

Gerhardt, John R., **Summary of meteorological measurements made for an overwater path near Galveston, Texas, during June and July 1949.** Texas. University. Electrical Engineering Research Laboratory, Contract N5ori-13601 (NR-071-031), Report No. 36, Dec. 1 **1949.** 17 p. 9 figs., 9 refs. **DWB**—This report summarizes the meteorological measurements made in conjunction with signal-strength and phase measurements of 3.2-centimeter radio waves for a 26.5-mile path over the Gulf of Mexico. Simultaneous meteorological soundings taken at both ends of the radio path demonstrate the essential uniformity of propagation conditions over the path, although individual measurements may show wide deviations from average patterns. Under uniform meteorological conditions, wind speed is again shown to be the primary agent in controlling the structure of the existing M curve. *Subject Headings* **1. Radio wave propagation 2. Wind effects 3. Gulf of Mexico.**—*Author's abstract.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON IONOSPHERIC PROPAGATION

By: *Malcolm Rigby and Mary L. Rice*

INTRODUCTION

Radio propagation investigations have given us most of the knowledge of the structure and physics of the ionosphere which we have today. In turn, knowledge of the upper atmosphere gained through study of meteor trails, sunspots, auroras, twilight, airglow, rocket flights, magnetic disturbances, etc. has greatly improved radio transmission and has lead to development of Radar and other useful devices for study of the atmosphere and for navigation.

Balfour Stewart (1882) and A. Schuster (1889) suggested that variations in the earth's magnetism must depend on electrical conditions in a region exterior to the earth's crust.

Popov in 1895 developed equipment for detecting electromagnetic impulses from lightning. After Marconi transmitted long wave radio signals across the Atlantic in 1900 (theoretically impossible at that time), Heaviside hit on the true explanation (6D–1) but tried for years to ignore or disprove his own hypothesis in favor of a mathematical model which was then in vogue. Eccles and Airey (1911, 1912) refer to this intuitive discovery of Heaviside. It was not, however, until Kennelly proved the existence of the layer that real progress began in this field of geophysics. Tuve (1926) discovered that pulses (short wave) could be used to penetrate some of the lower layers and thus determine the boundaries of the upper ionospheric layers. Later (1939) it was discovered that vertical pulses gave us good knowledge of all but local abnormal or sporadic ionospheric layers and hence could be used for obtaining data to forecast ionospheric conditions.

By 1955, thousands of papers had been written about the ionosphere—hence it would be impossible to include in a bibliography such as this even a representative sample of such vast literature. Because we had a large accumulation of unpublished abstracts on the ionosphere, and new ones were coming in at a faster rate than we could publish in current abstracts without neglecting other equally important subjects, we decided to publish all of these accumulated items, adding a few earlier works which were either of historical interest or of a comprehensive nature (for reference purposes) and omitting papers on *Tropospheric Propagation* and on the *Physico-chemical Processes in the Ionosphere* for future bibliographies. Important references will be found in past bibliographies on Radar Meteorology, Sferics, and Auroral Physics (*see* 2(8), Aug. 1951, 4(11), Nov. 1953 and 5(3), March 1954, *MAB*). In current abstracts (Part I of each issue) numerous items appear under the general heading of Structure of Atmosphere—Ionosphere (551.510.535), or they can be located by consulting the annual subject indexes.

For additional references to early material 6D–27, 6D–30 and 6D–127 are especially valuable. A number of periodicals, regularly containing abstracts or bibliographic lists, should also be consulted: **American Geophysical Union, Transactions** (see 6A–41, Jan. 1955); France. Centre National de la Recherche Scientifique, **Bulletin Analytique** (5C–239, March 1954 and 6A–22, Jan. 1955); **Institute of Radio Engineers, Proceedings** (6A–43, Jan. 1955); **Journal of Atmospheric and Terrestrial Physics** (2.6–13, June 1951); **Journal of Geophysical Research** (4J–235, Oct. 1953 and 6A–44, Jan. 1955); **Meteorological Abstracts and Bibliography** (6A–7, Jan. 1955) and **Physics Abstracts** (5C–254, March 1954 and 6A–30, Jan. 1955). For reviews of other periodicals which are valuable sources of reference *see* 6D–288 to 6D–293.

The Outline of Contents is a guide to the various subjects emphasized as well as the geographic areas covered.

A large amount of additional material on this subject which could not be included in this issue because of time and space limitations will be found in the section on Upper Atmosphere-Ionosphere (551.510.535) in Part I of V. 6, No. 8, Aug. 1955, MAB.

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1902

6D–1 551.510.535

Heaviside, Sir Oliver and others, **Telegraphy.** *Encyclopaedia Britannica*, London & Edinburgh, dam and Charles Black, **1902.** 10th ed. v. 9 (i.e. v. 33 of 9th ed.), p. 213–235. refs., 20 eqs. **LC**—On p. 215 of this comprehensive treatise on the recent discoveries in theory of electromagnetic

propagation in air, sea, earth and wires, and applications to wireless and land and submarine telegraphy, the author hints at the possibility of "a sufficiently conducting layer in the upper air" to serve as one plane of a wave guide—the other plane being the sea surface. Then the theoretical equations for propagation of signals between two such guides are developed. It was years before the author completely accepted his own theory as there was no experimental proof other than the fact of trans-Atlantic propagation up to 2100 mi but with legible messages received at only 700 mi by day and 1500 mi by night (p. 233). *Subject Headings:* **1. Ionospheric theory 2. Discovery of ionosphere.**—*M.R.*

6D–2 551.510.535

Kennelly, A. E., **On the elevation of the electrically conducting strata of the earth's atmosphere.** *Electrical World and Engineer*, N. Y., 39(11):473, March 15, **1902.** **DLC**—Author states that waves that are transmitted to distances that are large by comparison with 50 miles, may find an upper reflecting surface in the conducting rarefied strata of the air. If this is correct, the curvature of the earth plays no significant part in the phenomena. *Subject Headings:* **1. Ionospheric theory 2. Discovery of ionosphere.**—*M.L.R.*

1909

6D–3 551.510.535:621.396(02)

Lorentz, Hendrick Antoon, **The theory of electrons and its application to the phenomena of light and radiant heat.** Leipzig, B. G. Teubner, **1909.** 332 p. refs., numerous eqs. **DLC**—A large theoretical text which takes up in successive parts: I. General theory of free electrons which stems from theories of FARADAY and MAXWELL, p. 1–68; II. Emission and absorption of heat radiation after KIRCHOFF, BOLTZMANN, WIEN and JEANS, p. 68–97; III. Theory of Zeeman effect, p. 98–131; IV. Propagation of light in a body composed of molecules. Inverse Zeeman effect, p. 132–167; V. Optical effect in moving bodies, p. 168–230. The newly accepted theory of relativity of EINSTEIN is considered in the last chapter. All of the known effects, phenomena and theory which enter into wave propagation in the ionosphere are treated in this classical treatise on the electron, originally presented in a series of lectures at Columbia University in 1906. *Subject Headings:* **1. Radio wave propagation theory 2. Electron theory 3. Textbooks.**—*M.R.*

1912

6D–4 551.510.535:621.396

Eccles, W. H., **On the diurnal variations of the electric waves occurring in nature and in the propagation of electric waves round the bend of the earth.** *Royal Society of London, Proceedings, Ser. A*, 87(539):79–99, **1912.** 9 figs., foot-refs. **DLC**—Opens with a discussion of natural electrical waves affecting wireless telegraph stations. The source of these natural wave trains or "strays" at stations in England is thousands of miles away (it is assumed they are not "extraterrestrial"), the number received varies from hour to hour, and variations are more pronounced in summer. Typical 24-hour records are given. The remainder of the article is a discussion on the ionization of higher regions of the atmosphere, with reference to work of HEAVISIDE, ZENNECK and others. *Subject Headings:* **1. Radio wave propagation 2. Ionization.**—*M.L.R.*

1924

6D–5 551.510.535

Larmor, Sir Joseph, **Why wireless electrical rays can bend around the earth.** *Philosophical Magazine*, 48(288):1025–1036, Dec. **1924.** foot-refs., eqs. Also in: *Nature*, London, 114:650–651 Nov. **1924.** **DLC**—The fact that long electromagnetic waves can bend around the earth and be received at any place along the path is explained by the reflection from an ionized layer at an altitude sufficiently high so that the mean free path of the ions is long enough to prevent appreciable collision under the influence of the travelling wave (with resulting damping of the wave). The theory of propagation of long waves in ionized rare gas, the bending of optical rays, amplitude of oscillations of free ions, and wave propagation for a thin unchanging sheaf of rays is worked out mathematically. *Subject Headings:* **1. Radio wave propagation 2. Mean-free-path of ions.**—*M.R.*

1925

6D–6 551.510.535:621.39

Appleton, Edward V. and Barnett, M. A. F., **On some direct evidence for downward atmospheric reflection of electric rays.** *Royal Society of London, Proceedings, Ser. A*, 109(752):621–641, Dec **1925.** 8 figs., foot-refs., 7 eqs. **DLC**—Refers briefly to unsuccessful attempts of SMITH-ROSE and BARFIELD to find evidence for the existence of the Heaviside layer. Authors then describe two sets of experiments carried out at the Cavendish Laboratory, Cambridge, in which they compared intensities of fading of signals from London and Birmingham. These experiments were the firs

direct evidence of the existence of the Kennelly-Heaviside layer. Conclusions reached were: 1) atmospheric rays are elliptically polarized, 2) the reflection coefficient of the ionized layer is between 0.2 and 6% and 3) an inferior limit for the number of electrons per cc in the ionized layer is 10^5. *Subject Headings:* **1. Radio wave propagation 2. Ionization.**—*M.L.R.*

1926

6D–7 551.510.535:621.396

Breit, G. and Tuve, M. A., **A test of the existence of the conducting layer.** *Physical Review*, 28(3):554–575, Sept. **1926.** 11 figs., table, foot-refs., 20 eqs. **DLC**—(1) Groups of radio waves arrive at the receiving station separated from their echoes. This shows that the hypothesis of an ionized upper layer of the atmosphere is correct. (2) The retardation is such as though the layer were at a height of from 50 to 130 miles. The apparent height is greater in the fall than in the summer for 70-meter waves with an 8-mile base. (3) Radio fading is present for reflections alone quite independently of interference between the ground and the reflected waves. (4) A quantitative discussion of the possibilities of refraction shows that in most cases the increase of electronic density must be more sudden and discontinuous than that given by a density proportional to the square of the height or else that not all of the possible states of polarization of the waves in the upper atmosphere are present. *Subject Headings:* **1. Atmospheric conductivity 2. Pulse soundings 3. Radio fading.**—*From authors' abstract.*

1927

6D–8 551.510.535:550.384.3

Kega, Kazuo; Okada, Mituyo and Kato, Yasutaro, **Oscillating function of varying period and its application to geophysical problems.** *Tokyo. Univ. Faculty of Science, Journal, Sec.* 1, 1(10): 391–416, Dec. **1927.** plates, eqs. Contents: Foreword, by Sakuhei Fujiwhara. Pt. 1, **Note on an oscillating function of varying period.** Pt. 2, **On the pulsation of terrestrial magnetism.** Pt. 3, **Application of the theory of some linear integral equations. DWB**—Application of harmonic analysis (theory is shown in detail) in problem of predicting geomagnetic variations from periodic raising and lowering of ionosphere. *Subject Headings:* **1. Harmonic analysis 2. Geomagnetic variations 3. Ionospheric oscillations. I. Fujiwhara, Sakuhei.**—*M.R.*

6D–9 551.510.535:538.566(02)

†Pedersen, Peder Oluf, **Propagation of radio waves along the surface of the earth and in the atmosphere.** *Ingenieurvidenskabelige Skrifter, Ser. A*, 15a, Copenhagen (issued by Danmarks Naturvidenskabelige Samfund udgivet ved Udvalget for Ingeniorvidenskableig Forskning), **1927.** 244 p. numerous figs., 11 tables, foot-refs., eqs. Also: **Appendix.** *Ibid.*, 15b, **1927.** 19 p. figs. **DLC**—This is a pioneer text covering all the known theory and empirical knowledge of radio propagation in the troposphere and ionosphere. The physical and chemical properties of the atmosphere are discussed and illustrated with models and diagrams. Optical as well as electrical properties are considered. Effects of solar radiation and corpuscular emissions on ionization of rarified gasses, effects of wind, pressure, mean free path, number of collisions, lifetime of free electrons, recombination, cosmic rays, auroras, discontinuities, sunrise and sunset, wavelength, magnetic fields, etc., are discussed. *Subject Headings:* **1. Ionospheric propagation 2. Tropospheric propagation 3. Text-books.**—*M.R.*

1928

6D–10 551.510.535:621.396:551.594.5

Merritt, Ernest and Bostwick, William E., **A visual method of observing the influence of atmospheric conditions on radio reception.** *National Academy of Sciences, Wash., D. C., Proceedings*, 14(11):884–888, Nov. **1928. DLC**—The experiment described is that of a partial separation of the ground waves and the sky wave in radio communication. Two balanced coils were used (A and B). The A coil mounted with its plane vertical and directed toward the sending station, the B coil in vertical plane at right angles to this direction. The latter coil responds only to that component of the sky wave which is polarized with its electric vector horizontal and is not affected by the ground wave. Suitable amplification to one pair of plates of a cathode ray oscilloscope featuring respectively horizontal and vertical movements, combination of which results in a Lissajous figure on the screen. An example of the method as used during the presence of aurora is described. Further studies especially during sunset are contemplated. *Subject Headings:* **1. Radio wave propagation 2. Auroral effects on radio.**—*W.N.*

1937

6D–11 551.594.7:621.396:551.515.4(268)

Arkhangel'skiĭ, B. F., **Rasprostranenie radiovoln v severnykh shirotakh.** [Propagation of radio waves in northern latitudes.] *Leningrad. Arkticheskiĭ Nauchno-issledovatel'skiĭ Institut,*

Trudy, 78:17-20, **1937.** 5 figs. English summary p. 20. Preliminary report appears in: Vsesoiuznaia Konferentsiia po Izucheniiu Stratosfery, Leningrad 1934, **Trudy, 1935.** p. 333–337. 3 figs. **DLC**—Report on observations made in 1932/33 on Franz Josef Land, measuring the intensity of radio waves in the diapasone 20–2000 m, transmitted from stations with a distance from 2500 to 10,000 km. The influence of ultraviolet and corpuscular solar radiation during the polar day and night is discussed. The relation of sferics to the main regions of thunderstorm activity, presented on a map, is shown. (*Same item as* 5I–61, Sept. 1954, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Sferics 3. Thunderstorm activity 4. Franz Josef Land.**—*A.A.*

6D–12 551.510.535

†*Mimno, Harry Rowe, **The physics of the ionosphere.** *Reviews of Modern Physics*, 9(1):1–43 Jan. **1937.** 16 figs., 309 refs., 24 eqs. **DLC**—This important paper opens with a brief historical survey followed by a simple analysis of the more prominent features that distinguish the components of the radio spectrum. A more detailed discussion includes following topics among others: thunderstorms and barometric effects, local ionospheric clouds, scattering and interaction of radio waves etc. It is concluded that the complex physical system requires study by statistical methods. The classical magneto-ionic theory, or rather the anomalies, is considered. The molecular atomic ionization and recombination processes await a generally accepted theory explaining the stratification of the ionosphere. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric physics.**—*W.N.*

6D–13 55(05)(648.8)

†**Zentralblatt für Geophysik, Meteorologie und Geodäsie,** Berlin, v. 1–11, **1937–1944.** No more published. Monthly (varying no. of issues per vol.). Editors, Karl Jung, Gerhard Fenselau, and others. Classed arrangement (subject heads). Abstracts in German, occasionally in English. Last no. in each vol. constitutes author and subject indexes. This journal was a continuation of a special feature section entitled "Geophysik," previously contained in the **Zentralblatt für Mathematik und ihre Grenzgebiete. DLC**—Abstracts of the most important scientific and technical literature in each field of pure and applied geophysics, geodesy and physical geology are presented in each issue. Items on the ionosphere will be found under sections on Terrestrial Magnetism, Aurora and Ionosphere, Atmospheric Electricity and Radioactivity. A number of reviews of progress in specific fields are also presented. Abstracts are written by experts in every country under editorship of BARTELS, BOSSOLASCO, CHAPMAN, DEFANT, VON FICKER, FLEMMING, K. KNOCH, VENING MEINESZ, and L. WEICKMANN. (*Same items as* 4J–161, Oct. 1953 and 6A–38, Jan. 1955, *MAB.*) *Subject Headings:* **1. Geophysics abstracts 2. Meteorology abstracts. I. Jung, Gerhard** (*ed.*) —M.R.

1938

6D–14 551.510.535

†Zenneck, J., **Physik der hohen Atmosphäre.** [Physics of the upper atmosphere.] *Ergebnisse der Kosmischen Physik*, Leipzig, 3:1–37, **1938.** 21 figs., 28 refs. **DLC**—A scholarly and highly technical summary of all current knowledge of the ionosphere and methods of investigation of the ionospheric layers. In Pt. I, the physics of the ionosphere and physico-chemical processes are discussed; in Pt. II, normal ionization and Pt. III abnormal ionization are treated in detail and quantitative relationships shown in graphs and tables. Variations in ionization with height and time (diurnal and seasonal), solar eruptions, winds and sudden changes are considered. In Pt. IV the origin of ionization (Dellinger effect) and knowledge of pressure, temperature, atmospheric composition and horizontal and vertical air motion, electrical state in stratosphere gained through radio-propagation studies and meteor phenomena are also treated. The bibliography, though not extensive, is useful. *Subject Headings:* **1. Ionospheric physics 2. Progress in ionospheric research.** —*M.R.*

1939

6D–15 551.5(02) 551.510.535

*†Obolenskiĭ, V. N., **Meteorologiia.** [Meteorology.] Leningrad. Gidrometizdat., **1938/1939** 2 vols. v. 1, 639 p. 273 figs., 53 tables, refs. (at end of each ch.), 145 eqs. Price: 15 rub. v. 2, 443 p. 207 figs., 81 tables, 631 refs., numerous eqs. Price: 13 rub. **DWB**—Vol. I comprises a thorough theoretical and practical text on physical and synoptic meteorology. Vol. II takes up in more detail the advanced aspects of atmospheric optics, acoustics and electrical phenomena such as thunderstorm electricity, radioactivity and its effect on atmospheric ionization, atmospherics, ionosphere, solar radiation and magnetic effects. The chapter on ionosphere (p. 297–309) summarizes existing knowledge on methods of investigation (radio wave), results, theory, normal and abnormal investigations, diurnal and seasonal variations, clouds of electrons and ions, causes of variations in ionization of different layers, Dellinger effect, etc. *Subject Headings:* **1. Physical meteorology 2. Ionospheric physics 3. Textbooks.**—*M.R.*

6D–16 551.510.535

Plendl, Hans, **Über Ziele und Ergebnisse mehrjähriger Ionosphärenforschung.** [The aim and results of long period ionospheric research.] *Deutsche Akademie der Luftfahrtforschung, Munich, Schriften*, No. 6:29–91, 1938/1939, pub. **1939.** 34+13 figs., (incl. photos). Discussion, p. 68–91. **DLC**—Continuous ionospheric records, made at Munich, Potsdam and Rechlin with 80 m impulse equipment, during 13 solar rotations from Dec. 1937 to Dec. 1938, are presented, analyzed and discussed separately. The period was one of most extreme sunspot and auroral-magnetic storm activity. Records show that ionospheric structure is more variable than tropospheric weather. The need for records over a period of 50 years or more, in order to establish diurnal, seasonal and solar-period variations in the different layers and time and intensity relations for irregular as well as regular phenomena, is emphasized in discussion. Reflections from auroral forms show on a number of the records. It was found that disturbances in the geomagnetic field begin a few hours before ionospheric disturbances—an important point for forecasting disturbances in radio propagation. It was also found that vertical reflections approximate conditions for long distance propagation, which gives a convenient method of sounding for radio-ionospheric forecasts. This does not apply to the abnormal E layer which is of local character. The detailed discussion by BARTELS, GOUBAU, ZENNECK, MÖGEL, DIEMINGER, LANGE and O. v. SCHMIDT give additional illustrations of ionospheric records and comments on recent discoveries. The last comment, by SCHMIDT (p. 79–91), shows by means of models and excellent photographs the results of seismic wave propagation experiments in various media and at boundaries of media of different density, with theory of analogy to ionospheric propagation developed in some detail. *Subject Headings:* **1. Ionospheric variations 2. Ionospheric records 3. Solar-ionospheric relations 4. Impulse soundings 5. Germany. I. Bartels, Julius II. Schmidt, O. v.**—*M.R.*

1943

6D–17 551.510.535:551.521.4

KHvostikov, I. A., **Sopostavleniia svoĭstv svecheniia nochnogo neba i ionosfery.** [A comparison between the properties of luminosity of the night sky and ionosphere.] *Priroda*, 32(3):59–60, March **1943.** 2 figs. **DLC**—Results of such comparison made by B. HECHTEL in 1939–1940 during his observations are presented and discussed. These results showed only a slight dependence, the correlation coefficient averaged 0.3. However, the author indicates that these results are not conclusive that there is no real connection between these phenomena. Reflections of radio waves indicate the properties of the ionosphere only at the very point of reflection; reflections at different altitudes proceed differently (those from F layer are quite different from those from E layer). Night sky luminosity, on the other hand, originates in great depths and its brightness gives an average picture of the processes occurring simultaneously at different heights. *Subject Headings:* **1. Ionospheric reflection 2. Night airglow.**—*A.M.P.*

1946

6D–18 551.510.535:621.396:016

*†U. S. Army. Forces in the Pacific, **Report on Japanese research on radio wave propagation.** Tokyo, General Headquarters, U. S. Army Forces, Pacific Office of the Chief Signal Officer, **1946.** 2 v. (v. 1, 177+p.; v. 2, 133+p.) figs., numerous tables. **DLC**—Vol. 1 consists of a survey and summaries of Japanese technical literature (most of it in Japanese) written between 1926 and 1945. A list of the reports by source and by subject precedes the actual summaries. The heading of each summary contains the number, title, date of publication and author of paper and classification as to type (field manual, training manual, theoretical study, engineering study, etc.). A historical survey of Japanese propagation work (p. 10–13) and a summary of the more noteworthy features of the ionosphere as revealed by the Japanese observations (p. 18–19) are also included in Vol. 1. Vol. 2 consists almost entirely of tables summarizing Japanese ionospheric observations during the period from June 1934 to Aug. 1945. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric research 3. Japan.**—*M.L.R.*

1947

6D–19 551.510.535:551.590.21

Burkard, Otto (*Graz Univ., Austria*), **Die Abhängigkeit der F2-Grenzfrequenz von der Sonnentätigkeit.** [Dependence of the F2—border frequency on solar activity.] *Naturforschende Gesellschaft, Zurich, Vierteljahresschrift*, 92(2):115–117, June 30, **1947.** fig., 2 tables, 2 refs. **DLC**—WALDMEIER found a close relationship between the change of the sunspot frequency number and the changes of the F2 border frequency (correlation coefficient $r \cong .60$) (see *Ibid.*, 90:44–47, **1945**). The author points out that a better relationship can be found if we use the characteristic numbers of Ca-flocculi ($r = .82$ for both the diurnal and nocturnal group). *Subject Headings:* **1. Solar influences 2. F2 layer.**—*A.A.*

1948

6D–20 551.510.535:551.521.4

Bates, David R. and Massey, H. S. W., **A note on the ionic composition of the upper atmosphere.** (In: International conference on the emission spectra of the night sky and aurorae, London, 1947, **Papers,** pub. **1948.** p. 48–50. 7 refs., 2 eqs.) **DWB**—An attempt to find a relation between light of night sky (100 km or higher) and ionospheric layers. CHAPMAN's theory of layer formation is reviewed, concentration of negative ions (O^-) and its measurement discussed; diurnal variations accounted for. The contribution of O^- ions to night sky emission, as suggested by KASTLER (1946), and an alternative theory that source of continuum is two body radiative association between neutral atoms are both rejected if altitude of emitting layer is >500 km as reported by BARBIER (1947). *Subject Headings:* **1. Night airglow 2. Ion concentration in stratosphere 3. Ionospheric layers.** —*M.R.*

6D–21 551.510.535:621.396.11

Great Britain. Dept. of Scientific and Industrial Research. Radio Research [Board], **Fundamental principles of ionospheric transmission produced by the Inter-Service Ionosphere Bureau at the Great Baddow Research Laboratories of the Marconi Wireless Telegraph Company Ltd., Sept. 1943.** Its *Special Report,* No. 17, **1948,** reprinted **1952.** 81 p. 69 figs., eqs. **DWB**—A thorough and systematic survey of knowledge of many aspects of ionospheric transmission or reflection of electromagnetic waves. History, structure, physics, geometry, geography, ionization, polarization, formation of ionosphere, diurnal and seasonal variation, reflection from multiple layers, effect of frequency, corpuscular radiation, expansion, sunspot cycle, fading, magnetic storms, abnormal E, long distance scatter and spread F echoes. The name "Ionosphere" is said to have been suggested by WATSON-WATT. *Subject Headings:* **1. Ionosphere 2. Ionospheric propagation. I. Great Britain. Admiralty.**—*M.R.*

6D–22 551.510.535:06

Internationale Scientific Radio Union. Mixed Commission of the Ionosphere, **Réunion de Bruxelles du 28 au 30 julliet 1948. Brussels Meeting 28th to 30th July 1948.** *International Scientific Radio Union, Bulletin Mensuel,* No. 50:18–20, Aug. **1948. DLC**—The subjects for discussion with introductory speaker at the successive meetings were: 1) knowledge of the ionosphere by radio sounding methods (APPLETON); 2) knowledge of the ionosphere from studies of auroras (VEGARD); 3) atomic processes in the ionosphere (NICOLET); 4) solar knowledge relevant to the ionosphere (WOOLEY) and correlation of ionospheric with astrophysical phenomena (STRATTON); 5) knowledge of the ionosphere from studies of geomagnetism (CHAPMAN) and 6) general discussion on the work of the Commission. List of previous attendings and resolutions drawn up by the Commission are included. *Subject Heading:* **1. Ionospheric conferences.**—*M.L.R.*

6D–23 551.510.535

Kazantsev, A. N., **O pervykh nabliudeniiakh nochnogo ionizirovannogo sloiia, lezhashchego vyshe sloiia F2.** [First observations of the nocturnal ionized layer above F2 layer.] *Akademiia Nauk SSSR, Doklady,* 59(3):479–482, Jan. 21, **1948.** 4 figs., 2 refs. **DLC**—In connection with N. A. MEDNIKOVA's discovery in Feb. 1947 (*see* 6D–24), the author presents a series of extracts (with graphs) of reports (some previously published) on the measurement of effective heights of ionized layers between sunset and sunrise carried out by him near Moscow during the period 1933–1937 in which the F2 layer was recorded. Author points out that: 1) the critical frequency of the layer is smaller than the one of the F2; 2) it can be observed by disturbed condition of the atmosphere and probably is produced by corpuscular radiation of the sun and 3) as a rule, it is a night phenomenon appearing around sunset and vanishing at sunrise. *Subject Headings:* **1. Ionization 2. F2 layer.**—*A.M.P.*

6D–24 551.510.535

Mednikova, N. V., **Ionosfernye vozmushcheniia osobogo tipa.** [Particular types of ionospheric disturbances.] *Akademiia Nauk, SSSR, Doklady,* 59(3):475–478, Jan. 21, **1948.** 3 figs., ref. **DLC**—Observations of an aurora on Feb. 16, 1947 carried out at the meteorological stations of the Institute of Terrestrial Magnetism near Moscow with the aid of automatic equipment with a frequency range from 2 to 16 MHz led to the discovery of a particular type of ionospheric disturbance—an additional layer located above the normal F2 layer with critical frequencies much smaller than the ones of the F2 layer. The diffusivity of this layer increased with the growth of the disturbance but instead of rising as does the F2 layer it descended gradually. A subsequent careful examination of earlier records of ionospheric disturbance showed that from March 1946 to April 1947, 27 disturbances accompanied by appearances of this additional layer above F2 were recorded. It has been noted that this layer does not appear in all cases of high activity of auroras, but is always accompanied by auroras and at the time when the critical frequencies of F2 layer do not exceed

6 MHz. Photographs and graphs showing results of height and critical frequency measurement are included. *Subject Headings:* **1. Ionospheric disturbances 2. F2 layer 3. Auroral effects.**—*A.M.P.*

6D–25 551.510.535:621.396

U. S. National Bureau of Standards, **Ionospheric radio propagation.** Prepared by the U. S. Central Propagation Laboratory. *U. S. National Bureau of Standards, Circular*, 462, **1948.** 209 p. numerous figs., refs., eqs. **DLC**—This work is in part a revision and expansion of the IRPL **Radio propagation handbook** prepared during the war. It presents, in an elementary fashion, the theory and practical use of radio wave propagation involving the ionosphere. Specific chapters deal with: Theory of radio wave propagation, Measurement techniques, Structure of the ionosphere, Variations of the ionosphere and Ionospheric absorption and sky-wave field intensity. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*M.L.R.*

6D–26 551.510.535

Woodward, Richard Horace, **Model of the ionosphere.** Harvard Univ. Cruft Laboratory, Contract N5-ORI-7601, Technical Report, No. 26, Jan. 25, **1948.** 24 p. 14 figs., 23 refs., eqs. **DWB**—Observations and theories of a number of geophysical phenomena associated with the ionosphere are summarized. A proposed model of the ionosphere seems to provide qualitative interpretations of most of these phenomena. In low and intermediate latitudes electrons are assumed to rise; they migrate through the upper ionosphere to the polar region, where they fall and complete the circuit through the ground. Under the action of an electric field, positive ions, which are formed at great heights by ultraviolet light, tend to rise, whereas negative ions descend. Since the ions are constrained to helical paths along the sloping magnetic lines of force, positive ions tend to collect in a ring near the plane of the geomagnetic equator; negative ions accumulate in the polar regions. Solar radiation pressure distorts the ion-ring and blows the tail to a height of several earth-radii. Electric discharges between the positive ion-ring and the negative polar caps produce magnetic disturbances and the associated auroral displays. *Subject Headings:* **1. Ionospheric models 2. Geophysical phenomena 3. Atmospheric ions.**—*Author's abstract.*

1949

6D–27 551.510.535:621.396:016

†Al'pert, IA. L., **Rasprostranenie radiovoln. Spetsializirovannyĭ bibliograficheskiĭ spravochnik.** [Radio wave propagation. Specialized bibliographic reference book.] Moscow, Izdatel'stvo Akademii Nauk SSSR, **1949.** 195 p. At head of t-p: Akademiia Nauk SSSR, Otdelenie Fiziko-Matematicheskikh Nauk. **DLC**—Fifty books are arranged chronologically by imprint and over 1500 articles from periodicals are arranged under the following main headings: I. Propagation of radio waves over the earth's surface (291 refs.), II. Propagation of radio waves in the ionosphere (875 refs.), III. Propagation of the "celestial" ray (199 refs.), IV. Propagation of ultrashort waves (93 refs.), V. Propagation of radio waves in the troposphere (57 refs.) and VI. Investigation on sferics (99 refs.). In some cases, a section is subdivided. References are arranged chronologically within a section (or sub-section). Included are a list of 75 periodicals arranged by country (Russia, England, U. S., France, Germany, Italy, Japan, Australia, India and Canada) with abbreviation and an author index alphabetically arranged. All titles are in the original language. Imprints cover the period from 1878–1948. *Subject Headings:* **1. Bibliography on radio wave propagation 2. Radio wave propagation bibliographies.**—*M.L.R.*

6D–28 551.510.535:621.396.029

Axman, E. and Benner, A. H. (*Penna. St. Coll. Radio Prop. Lab.*), **Preliminary measurements of the vertical incidence ionospheric absorption at 150 Kc/s.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19 (122)-44, Basic Ionospheric Research, Technical Report, No. 6, Sept. 30, **1949.** 23 p. 82 figs., 5 refs. **DWB**—The results of manual and semi-automatic measurements of the reflection coefficient at vertical incidence at 150 Kc/s that were performed during Feb. 27 to June 25, 1949 at State College, Penna., are presented in graphs and analyzed on a diurnal basis. Although incomplete, no midday hour reflections were obtained, the data were used in an attempt to find a correlation between SID and the absorption record. No conclusions are drawn. Theory of measurement is discussed along with illustrated description of equipment used. *Subject Headings:* **1. Ionospheric absorption 2. Radio wave propagation.**—*W.N.*

6D–29 551.510.535:621.396

Boyd, J. E.; Martin, Roy A.; Brown, F. B. and others, **The effect of atmospheric conditions on the propagation characteristics of electromagnetic waves in the microwave region.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Project 109–8, Progress Reports, No. 16, 18, 19, 22, Jan. 31, May 31, Aug. 31, **1948,** and May 31, **1949.** 4 pieces. figs., refs. **DWB**—The work under this contract is a thorough investigation

of point-to-point radio propagation over 30–50 miles paths with varying microwave frequencies (L, S and X-band) and simultaneous detailed meteorological measurements along the paths. The contemplated comparison and analysis of the propagation and the meteorological data obtained are aimed to (1) determine the effects of various meteorological conditions on radio propagation and (2) to determine an optimum frequency. Radiosondes, balloon sounding (meteorograph), aircraft sounding and automatic weather stations were used in the investigation. The data obtained are presented graphically in: Report No. 16, from Oct. 10 to Nov. 21, 1947. Report No. 18 reviews and schedules future work. No data. Report No. 19 contains description of the automatic weather station, and the data on propagation and meteorological measurements from June 29 through July 12, 1948, and from July 27 through Aug. 9, 1948, and Report No. 22 gives review and schedule of future work. No data. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric soundings 3. Meteorological effects. I. Yoe, Catherine II. Roberts, T. E. III. Lowance, F. E.**—*W.N.*

6D–30 551.510.535:016:621.396

†Fleming, John Adam, (*ed.*), **Terrestrial magnetism and electricity.** Contributors, J. Bartels and others. [Reprinted with corrections.] N. Y., Dover Publications, [1949]. numerous figs. tables, eqs. *Physics of the Earth*, v. 8. **DLC**—An excellent reference work on all aspects of the subject. It contains 12 chapters written by experts in the fields, and a comprehensive bibliography of 1523 refs. in ch. 13. Three chapters particularly applicable to this bibliography are: ch. 9, Berkner L. V., **Radio exploration of the earth's outer atmosphere** (p. 439–491). Ch. 10, Hulburt, E. O. **The upper atmosphere** (p. 492–572). Ch. 13, Harradon, Harry Durward, **Bibliographic notes and selected references** (p. 679–718). Section D of the bibliography (p. 749–758) contains 183 references to works on the ionosphere. The bulk of the material was published in the 1920's and 1930's (*See also* 4J–177, Oct. 1953 and 6B–62, Feb. 1955, *MAB.*) *Subject Headings:* **1. Ionosphere 2. Radio investigation of ionosphere 3. Ionosphere bibliographies.**—*M.L.R.*

6D–31 551.510.535:551.594.12

*Grace, Clinton H.; Kelso, J. M. and Miller, J. W., **The experimental determination of the scale height, height of the bottom and true height of the maximum ionization of the E layer under undisturbed conditions.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Technical Report, No. 3, June 15, **1949.** 15 p. 28 figs., 7 tables, 8 refs., 10 eqs. **DWB**—Since published data pertinent to the subject can be classified into (1) undisturbed and (2) disturbed categories, authors determined and developed the respective parameters and present the detailed data obtained for the normal conditions of the E layer which are discussed in relation to the data for abnormal or disturbed conditions. *Subject Headings:* **1. E layer ionization 2. Ionization** —*W.N.*

6D–32 551.510.535:621.39

†Kelso, John M., **Approximate solutions of some problems in the theory of ionospheric radio wave propagation.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Technical Report, No. 2, June 1, **1949.** 146 p. 46 figs., 31 refs., 127 eqs. **DWB**—A dissertation for the Ph.D. degree at Penna. State College. The double parabola approximation to the Chapman distribution of electron density as a function of height is applied to propagation via the E layer (*see item* 6D–33). Analytical expressions are given for: (1) the true- and group heights of reflection, (2) ray paths, (3) reflection coefficient, (4) ionospheric range, (5) ground range (6) MUF for the Sellmeyer dispersion theory, plane ionosphere and earth geometry. Graphical results for MUF are given. The results are compared with the dispersion theories of Lorentz and of Sellmeyer, the scale heights and height of bottom layer of which are discussed. A method for determining the collision frequency at maximum ionization level is suggested. Another method that will determine whether the Sellmeyer or the Lorentz dispersion should be used in ionospheric calculation is outlined. *Subject Headings:* **1. Radio wave propagation 2. Ionosphere.**—*W.N.*

6D–33 551.594.7:551.510.53

Kelso, John M., **The maximum height of reflection of a radio wave in a curved ionosphere layer** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Technical Report, No. 1, May 1, **1949.** 4 p. graph, 3 refs., 7 eqs. **DWB**—There is an upper limit to the possible height of reflection in a curved ionosphere (below the level of maximum ionization) where the signal will travel through the layer. This is presented theoretically by an expression derived from the double parabola approximation to the Chapman distribution of ionization as a function of height. *Subject Headings:* **1. Radiowave propagation 2. Ionospheric reflection.**—*W.N.*

6D–34 551.510.535:621.39

Ratcliffe, J. A. (*Cavendish Lab., Cambridge, Univ.*), **A review of the research work being conducted at the Pennsylvania State College on the propagation of radio waves through the ionosphere**

Pennsylvania. State College. Radio Propagation Laboratory. Contract AF 19(122)-44, Technical Report, No. 4, July 15, 1949. 7 p. **DWB**—*Subject Headings:* **1. Ionospheric research 2. Radio wave propagation.**

6D–35 551.510.535:621.396

Sulzer, Peter G. and Underhill, B. B. (*Pa. St. Coll. Radio Propag. Lab.*), **Preliminary vertical incidence equivalent height versus time recordings on 150 Kc/s.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-144, Basic Ionospheric Research, Technical Report, No. 8, Dec. 15, 1949. 13 p. 34 figs., 3 tables, 6 refs. **DWB**—Vertical incidence equivalent height versus time measurements at 150 Kc/s are described in this report. The preliminary measurements reported were obtained during the interval March 4 to June 21, 1949. The transmitting and receiving equipment utilized for the measurements is described in some detail. Reproductions of the photographic records procured during the above interval are included for each day on which satisfactory records were obtained. Some initial correlations and interpretation of the data are attempted. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric research 3. Ionospheric recorders.**—*Authors' abstract.*

1950

6D–36 551.510.535:621.396

*†Benner, Arthur H. (*Penna. St. Coll. Radio Propagation Lab.*), **Interim report on long wave ionospheric absorption theory.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 10, Jan. 20, 1950. 27 p. 32+figs., 27 refs., 41 eqs. **DWB**—As an initial step toward the explanation of the causes and mechanism of ionospheric absorption of long waves at vertical incidence at 150 Kc/s, this theoretical attack is restricted to the special conditions at State College, Penna. Based on the Appleton-Hartree dispersion equation, expressions were obtained for the absorption coefficient for various types of reflecting layers in the lower E region. *Subject Headings:* **1. Ionospheric absorption 2. E layer 3. Radio wave propagation 4. Long waves.**—*W.N.*

6D–37 551.510.535:621.396.812.3

*Benner, A. H., **Second report on measurements of the vertical incidence ionospheric absorption at 150 Kc/s.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 13, June 20, 1950. 16 p. 14 figs., 4 tables, graphs, 18 refs. **DWB**—A direct continuation of the measurements of radio waves at vertical incidence at 150 Kc/s covering the period from July 1, 1949–Jan. 31, 1950. The data obtained are presented as diurnal plots of the total absorption. *Subject Headings:* **1. Ionospheric absorption 2. Radio wave propagation 3. Long waves.**—*W.N.*

6D–38 551.510.535:621.396:551.594.6

Gardner, F. F., **The use of atmospherics to study the propagation of very long waves.** *Philosophical Magazine*, London, 41(323):1259–1269, Dec. **1950.** 6 figs., 4 refs. **DLC**—The "level" of integrated atmospherics received on narrow-band receivers tuned to a series of different frequencies between 3.5 and 50 kc/s has been recorded and the results analyzed. The most significant effect is a marked attenuation of waves of frequency below 10 kc/s when travelling over distances of 1,000 km or more. This attenuation is discussed and is related to the quasi-sinusoidal waveform often assumed by atmospherics which have travelled great distances. A decrease in the level of atmospherics has been found to occur during sudden ionosphere disturbances on frequencies below about 10 kc/s. This contrasts with the known increase on frequencies above about 20 kc/s. *Subject Headings:* **1. Radio wave propagation 2. Sferics.**—*From author's abstract.*

6D–39 551.510.535

*Grace, Clinton H. and Underhill, C. R. (*Penna. St. Coll., Radio Propag. Lab.*), **Measurements of sporadic E ionization at State College, Pennsylvania.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 14, June 30, **1950.** 18+p. 7 figs., tables. **DWB**—The detailed data on sporadic E layer for the year 1949 are presented. Sporadic E layer is more prevalent in summer than in winter. However the highest frequency at vertical incidence, approximately 18 Mc, occurred on Nov. 1st. An example of the unpredictability of the sporadic E layer is presented as well as details of the stormy conditions of Nov. 2, 1949. *Subject Headings:* **1. Sporadic E layer 2. Sporadic E layer ionization 3. State College, Penna.**—*W.N.*

6D–40 551.501.8:551.510.535

Helliwell, R. A.; Mallinckrodt, A. J.; Kruse, F. W., Jr. and Wambasganss, B. A., **Pulse studies of the ionosphere at low frequencies.** Stanford Univ. Electronics Research Laboratory, Contract

CST-8966, July 1, 1948-June 30, 1949. March 15, 1950. 132 p. 55 figs., eqs. **DWB**—A voluminous report of pulse studies made at Stanford on low frequencies (100, 325, 350, 560, 850, 1120 and 1415 kc) from July 1948 to Sept. 1949. Weak echoes occurred from 35–85 km but those below 65 km are of doubtful origin. Apparatus for transmitting and receiving, notes on low level echoes, diurnal variation, splitting, vertical gradients of ionization, night time critical frequency of E region, diurnal and annual height trends, polarization, sunrise effect and sferics are treated in detail. The ionospheric storm of May 11–13, 1949 is analyzed and discussed at length. *Subject Headings:* **1. Ionosphere 2. Sferics studies 3. Ionospheric storms.**—*M.R.*

6D–41 551.510.535:550.38

Jouaust, Raymond, **L'état de nos connaissances sur l'ionosphère et ses relations avec le magnétisme terrestre.** [The status of our knowledge of the ionosphere and of its relations to terrestrial magnetism.] (In: **Problèmes de Géomagnétisme,** by J. P. Rothe, et al. Paris, Revue d'Optique Théorique et Instrumentale, **1950.** p. 65–76.) Biographical note on JOUAUST, p. 76. **DLC**—Textbook type treatment. *Subject Headings:* **1. Ionosphere 2. Terrestrial magnetism.**—*M.R.*

6D–42 551.510.535:551.521.3

Kelso, John M., **The effect of the Lorentz polarization term on the vertical incidence absorption in a deviating ionosphere layer.** *U. S. Air Force Cambridge Research Center, Geophysical Research Papers,* No. 7:72–95, Dec. **1950.** 4 figs., 15 refs., 34 eqs. **DWB**—A summary of preliminary work is given. The refraction, absorption and reflection in the ionosphere are examined. Special attention is given to the nondeviating and deviating region absorption. The theories of LORENTZ and SELLMEYER are compared. *Subject Headings:* **1. Ionospheric research 2. Absorption.**—*A.A.*

6D–43 551.510.535:551.593.7

Kelso, John M., **Elliptical polarization and its application to the polarization of ionospherically reflected long radio waves.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 11, June 1, **1950.** 37 p. 22 figs., tables, 10 refs., eqs. **DWB**—The problem of polarization of ionospherically reflected radio waves is discussed in detail. Author demonstrates that the statement of TAYLOR and MARTIN "that the polarization ellipses of the two magneto-ionic are always oriented so that their major axes are perpendicular" is not generally true. *Subject Headings:* **1. Ionospheric reflection 2. Radio wave propagation 3. Long waves 4. Polarization.**—*W.N.*

6D–44 551.510.535:523

†Massey, Harrie Stewart W. (*Univ. of London*), **Negative ions.** 2d ed. Cambridge, Univ. Press, **1950.** 136 p. 31 figs., bibliog. p. 130–133. *Cambridge Monographs on Physics.* **DLC**—Book discusses all types and methods of formation of negative ions, dissociation and recombination processes and in the final chapter, **Negative ions in glow discharges** (p. 101–130), the processes in the upper atmosphere which are associated with ionization, also negative ions in stellar atmospheres, formation, height variations, diurnal changes, concentrations of ions and electrons and night sky emissions. *Subject Headings:* **1. Negative ions 2. Ionospheric processes 3. Ionization in stellar atmosphere 4. Textbooks.**—*M.R.*

6D–45 551.510.535:551.557

Millman, G. H. (*Pa. St. Coll. Ionosphere Res. Lab.*), **Initial ionosphere wind measurements at 150 Kc/s.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 17, Dec. 25, **1950.** 30 p.+35 figs., 21 refs., eqs. **DWB**—Four experimental tests were carried out during the first part of 1950 to measure winds in the E layer at 150 kc/s at vertical incidence. Direction and magnitude of winds observed April 3 between 2000 to 2400 LMST and June 29 between 1900 to 2330 LMST are calculated and tabulated. Double and triple spaced receivers were used. The amplitude of the first hop echo as a function of time was recorded four times. Fading records obtained (1) during an ionospheric storm, (2) during less disturbed period of an ionospheric storm and (3) under normal conditions are statistically analyzed for a Rayleigh and a Gaussian distribution of the amplitude of the reflected signal and change in amplitude respectively. *Subject Headings:* **1. Ionosphere 2. Radio wave propagation 3. Ionospheric wind measurement.**—*W.N.*

6D–46 551.510.535

Pfister, Wolfgang (*Geo. Res. Dir. Cambridge Field Sta.*), **Effect of the D-ionospheric layer on very low frequency radio waves.** *U. S. Air Force Cambridge Research Laboratories, Geophysical Research Papers,* No. 7:107–135, Dec. **1950.** 15 figs., 16 refs., 12 eqs. **DWB**—The normal D layer exists at a level of about 60 km. The rate of ion production is of the order of 10 cm^{-3} sec^{-1}. Values

for the reflection have been calculated for different ionization and for different angles of incidence. Also transmission values have been obtained. Instructive diagrams are given. The final assumed model of the D layer is summarized. *Subject Headings:* **1. Ionospheric research 2. D layer.**—*A.A.*

6D–47 551.510.535:621.396

Pierce, J. A., **Pulse transmission over long distances.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 7:56–57, Dec. **1950. DWB**—The author used a stable oscillator with manual adjustment of frequency and phase and also either a stable or relatively unstable oscillator with a servomechanism. A few results are discussed, showing the variation in behavior and the general importance in communication of the Pedersen rays. *Subject Headings:* **1. Radio wave propagation 2. Pedersen rays.**—*A.A.*

6D–48 551.510.535:621.396.812

Ratcliffe, J. A., **The production of fading by an irregular ionosphere.** *U. S. Air Force Cambridge Research Center, Geophysical Research Papers*, No. 7:166, Dec. **1950. DWB**—Short abstract of a report on the conference of June 1949. Radio fading is produced by diffractive reflection from the ionosphere acting as a rough surface. *Subject Headings:* **1. Ionosphere 2. Radio fading.**—*A.A.*

6D–49 551.510.535:621.396.812.3

*Van Meter, D. (*Pa. St. Coll. Radio Prop. Lab.*), **Vertical incidence equivalent height versus time recording on 150 Kc/s.** Pennsylvania. State College. Radio Propagation Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 12, June 15, **1950.** 6 p.+8 figs., table, 2 refs. Appendix: **Tabulation of equivalent-height-versus-time data from from March 4, 1949 to Jan. 31, 1950. DWB**—This report, a continuation of Technical Report, No. 8 (*see* 6D–35), presents equivalent-height-versus-time data taken at 150 Kc/s between March 4, 1949 and January 31, 1950. The body of the report is a tabulation, at 15-minute intervals, of the equivalents heights obtained over the above period. Included also are graphs and a table presenting: 1) Diurnal height variations for a few days at the end of December, 1949, 2) Monthly mean heights versus diurnal time, 3) Sunset and sunrise correlations, 4) Seasonal variations of midnight and noon heights, 5) Comparison of storminess indices with CRPL indices and 6) Effects of sudden ionospheric disturbances reported by CRPL. *Subject Headings:* **1. Ionospheric research 2. Radio wave propagation.**—*Author's abstract.*

1951

6D–50 551.510.535:551.590.21

Aarons, Jules, **Low-frequency noise disturbance.** *American Academy of Arts and Sciences, Proceedings*, 79(4):266–279, July **1951.** 8 figs., 4 refs. **DWB**—A discussion of the diurnal variation of the critical frequency of electrons in the F, F1, and F2 layers and of the relationship of long term solar variations (11-year cycle for example), short-term solar variations (life of sunspot region) and solar outbursts (flares) to the critical electron frequencies. *Subject Headings:* **1. F layers 2. Electron frequencies 3. Solar influences.**—*I.L.D.*

6D–51 551.510.535:001

Becker, Walter and Dieminger, Walter, **Zur Definition der E2-Schicht.** [On the definition of E2 layer.] *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 126–138. 6 figs., 2 tables, 21 refs. English and French summaries p. 138. **DWB**—A study of the thin homogeneous layer between the E and F layer which is called the E2 layer. It was discovered as a result of observations with high power, multifrequency recording system. The E2 layer is observed with great regularity, is very stable and easily distinguished from the other intermediate layers that are seldom recorded at Lindau; the limiting frequency is only 0–2 to 0–3 MHz greater than that of the E1 layer, and shows direct dependence on solar altitude. *Subject Headings:* **1. E2 layer 2. Definitions.**—*M.R.*

6D–52 551.510.535:621.396.9

*†Benner, Arthur H., **Vertical incidence ionospheric absorption at low frequencies.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 18, Jan. 15, **1951** (rev. Jan. 30, 1952). 84 p. 32 figs., 5 tables, graphs, 22 refs. **DWB**—This study includes an examination of the complex index of refraction at frequency 150 kc/s with the aid of the Appleton-Hartree dispersion equation. The E layer coefficient is obtained, the values of which are dependent on the characteristics of the E region at maximum of ionization. Contributions of the deviating E and the nondeviating D region are calculated as the total absorption, however it is tentatively concluded that the D region is not a pure electron layer; ions must be considered too. Data on typical vertical incidence at 150 kc/s from March 1949 through June 1950 are presented and analyzed for correlation with some meteorological factors.

Several conclusions and new problems pertinent to the subject are presented. A detailed description of the automatic measurement equipment is given. *Subject Headings:* **1. Ionospheric absorption 2. Radio wave propagation 3. Refractive index 4. E layer 5. D layer.**—*W.N.*

6D–53 551.510.535:551.543

Beynon, W. J. G. and Brown, G. M. (*Univ. Coll. of Swansea*), **Ionospheric and meteorological changes in the period January–April 1949.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 175–181. 3 figs., 5 refs. **DWB**—A remarkable correlation is shown between variations in magnetic K-index and pressure at sea level at Kew, England, during Jan.–April 1949—a season of remarkable weather over Europe and North America. A 27-day recurrence tendency is evident. *Subject Headings:* **1. Twenty-seven-day ionospheric cycles 2. Geomagnetic correlation with pressure 3. Periodicities 4. Kew, England.**—*M.R.*

6D–54 551.510.535

Beynon, W. J. G. and Brown, G. M., **A 27-day recurrence tendency in the normal E-layer critical frequency.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 156–161. 2 figs. French summary, p. 161. **DWB**—Analysis by means of a synchronized harmonic dial shows; (a) a clear 27-day variation in fE, and that during high sunspot activity this variation is marked, (b) no significant phase difference between 27-day variation in fE and corresponding variation in sunspot number data and (c) the average sensitivity of fE to sunspot number changes based on this study is less than that deduced from long term solar cycle data. *Subject Headings:* **1. E layer critical frequencies 2. Twenty-seven-day ionospheric cycles.**—*M.R.*

6D–55 551.594.7:621.396

Booker, H. G. (*Cornell Univ.*), **Meteorological aspects of propagation problems.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 1290–1296. 3 figs., 20 refs., 5 eqs.) **MH-BH**—The phenomenon of superrefraction or extra downward refraction in which the downward refraction of radio waves exceeds the curvature of the earth, as experienced at radar stations is described and the regions in which this phenomenon has been observed are listed. An explanation of the origin of superrefraction in terms of the temperature excess and of the humidity deficit of the appropriate air mass in relation to the earth's surface is presented. The problems of specifying accurately the temperature and humidity gradients and other meteorological data from generally available synoptic data and the meteorological factors responsible for these gradients are discussed. Some of the meteorological investigations made by R. A. Craig and H. G. Booker on the measurement of temperature and humidity at various heights and the explanation of their distribution by a theory of the modification in air mass by eddy diffusion are summarized. (*Same item as* 4.8–4, Aug. 1953, *MAB.*) *Subject Headings:* **1. Superrefraction 2. Radio wave propagation 3. Radio transmission ducts 4. Compendium articles.**—*I.L.D.*

6D–56 551.510.535:621.396.812.3

*Bornholdt, John W. and Jackson, Thomas T. (*Pa. St. Coll. Io. Res. Lab.*), **Oblique incidence measurements at 150 Kc/s.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 21, March 30, **1951.** 71 p. 47 figs., 9 refs. **DWB**—Results of measurements of 150 Kc/s pulse signals at ranges from 25 kilometers to 180 kilometers are described. A short description of receiving and transmitting equipment is given, followed by a detailed account of methods of data analysis. Data presented includes virtual height and reflection coefficient as a function of range and time, and polarization ellipse specifications as a function of range, time and azimuth. A short study of the fine structure of the lower ionosphere is given, including pulse shape variations and a chart and photographs of "D-layer" echoes. The report is concluded with a section of data interpretation and recommendations for future work. *Subject Headings:* **1. Ionospheric structure 2. Ionospheric recorders 3. Radio wave propagation 4. D layer.**—*Authors' abstract.*

6D–57 551.510.535:551.594.12:550.38

Burkard, Otto, **Der Einfluss des magnetischen Erdfeldes auf die F2-Schicht.** [Influence of the geomagnetic earth field on the F2 layer.] *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 145–154. 3 figs., 6 refs. English and French summaries p. 153–154. **DWB**—New discoveries regarding the local temporal variations of the F2 layer obtained from recent ionospheric and magnetic records are: (a) the ionization in the forenoon is related to solar angle according to: $f^2 = \cos x + \beta$ (x = zenith angle of sun); (b) α and β exhibit geomagnetic influence; (c) yearly mean β is directly proportional to product $H \cos \phi$ where H is horizontal component; (d) α shows marked annual variation, with minimum in

summer (due to temperature effect); (e) in the morning the equatorial zone (both magnetic and geographic) is strongly ionized in contrast to noon values. *Subject Headings:* **1. F2 layer ionization variations 2. Magnetic field influences.**—*Author's abstract.*

6D–58 551.510.535:551.551

Burkard, Otto, **Isanomalen der F2-Ionisation.** [Isanomals of F2 ionization.] *Journal of Geophysical Research*, 56(4):595–600, Dec. **1951.** 4 figs., 3 refs. **DWB**—Author calculated the departures of the maximum electronic concentration in the F2 layer from the corresponding monthly mean value and presents maps with isanomals for northwest and central Europe. The surprising result is the appearance of intensive turbulence (Grossturbulenz) in the F2 layer. The problem is whether this turbulence phenomenon is connected with shifting of masses or is limited by the electrical state. *Subject Headings:* **1. Ionospheric turbulence 2. F2 layer 3. Europe.**—*A.A.*

6D–59 551.510.535

Davids, Norman, **A geometric interpretation of the π-wave and coupling factor in ionospheric long-wave theory.** *Journal of Geophysical Research*, 56(4):611–612, Dec. **1951.** fig., ref., 2 eqs. **DLC**—Author shows in a short mathematical discussion that ordinary π-waves do not have any special physical significance but are components in a moving Cartesian coordinate system. *Subject Heading:* **1. Ionospheric movements.**—*A.A.*

6D–60 551.510.535:551.594.7

Feinstein, J. (*Natl. Bureau of Standards, Wash., D. C.*), **Higher order approximations in ionospheric wave propagation.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 207–215. 12 eqs. **DWB**—Lengthy solution of theory of wave propagation in ionosphere shows that although the higher order terms produced by non-linearity of medium are negligible in the absence of resonance, the ionosphere cannot be considered as a simple anisotropic medium which can be represented by a tensor type dielectric constant, or in other words a charged medium cannot be reduced to one that is passive. *Subject Heading:* **1. Ionospheric propagation.**—*From author's abstract.*

6D–61 551.510.535:629.396.11

Feinstein, J. **Ionospheric wave propagation at low frequencies.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 166–175. 3 figs., 3 refs. **DWB**—Theoretical and empirical comparison of wave theory and ray theory for propagation and reflection in a geomagnetic field. A true wave theory, not a ray or even a modified ray theory, is held to be the only reliable approach to solution of the observed characteristics of the ionosphere. *Subject Headings:* **1. Ionospheric propagation 2. Ray theory of ionospheric behavior 3. Wave theory.**—*M.R.*

6D–62 551.510.535:551.543:523.3

Gautier, T. N.; Knecht, R. W. and McNish, A. G. (*Natl. Bureau of Standards, Wash., D. C.*), **Lunar stratification of the F2-layer at Huancayo, Peru.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 100–105. 3 figs., 4 refs. **DWB**—Careful statistical analysis of time of separation of the F2 layer into two strata or layers, shows a strong dependence on the lunar hour and phase, but only during daylight (based on Huancayo, Peru data for Oct. 1948–Feb. 1949). Similar evidence of lunar stratification was found in the Christmas Island and Leyte, P. I. records (1945–1946). This supports the theory of MITRA and of BAILEY and MENZEL (1947) regarding drift of ions down along lines of magnetic force from high levels near the geomagnetic equator. *Subject Headings:* **1. Lunar stratification of F2 layer 2. Ionospheric semidiurnal lunar tides 3. Huancayo, Peru.**—*M.R.*

6D–63 551.510.535:551.557

Gerson, Nathaniel C. (*Air Force Cambridge Res. Labs., Mass.*), **Sporadic E investigations.** *International Council of Scientific Unions, Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 121–125. fig., 3 refs. **DWB**—Methods of exploring the ionosphere with radio (vertical incidence back scatter, and by networks of amateur stations) are reviewed, and the program initiated by the U. S. Air Force for collection of sporadic E layer data by the last named method described. Charts of sporadic E layer reflection points for 0100Z and 0500Z May 20, 1949, when 426 radio contacts were reported show a "cloud" moving from Arkansas toward the NNW at average velocity of 125 km/h (*see also* 3.11–104, Nov. 1952 and 4.1–89, Jan. 1953, *MAB*). *Subject Headings:* **1. Sporadic E movements 2. Ionospheric winds.**—*M.R.*

6D–64 551.594.12

Gibbons, J. J. (*Penna. St. Coll. Ionos. Res. Lab.*), **Investigation of initial transient behavior of the totally neutral ion cloud.** Pennsylvania. State College. Ionosphere Research Laboratory,

Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 30, Nov. 1, 1951. 18 p. 13 figs., 6 refs., 12 eqs. **DWB**—Several attempts to improve upon the Chapman-Ferraro solution of the transient or initial phase of the Störmer ring were made without success. Discussing the possibility of generating exact solutions of Maxwell's equations and the equations of motions of two non-viscous electric fluids of different sign and charge-mass ratios, a power series method carried through to terms in t^3 for charge densities, velocities, electric and magnetic fields is given. *Subject Heading:* **1. Ionization.**—*W.N.*

6D–65 551.510.535:538.566.3:523.755

Ginsburg, V. L., **O vliianii mezhduelektronnykh soudareniĭ na pogloshchenie radiovoln v F-sloe i v solnechnoĭ korone.** [The influence of collision among electrons on absorption of radiowaves in F layer and in the solar corona.] *Zhurnal Tekhnicheskoĭ Fiziki*, Moscow, 21(8):943–947, Aug. 1951. 10 refs., 9 eqs. **DLC**—Using the previous results obtained by himself and other authors, the author derives a formula for the calculation of the frequency of the impacts between electrons and molecules. The use of this formula, however, requires the knowledge of the temperature of the ionized layer, or other corresponding data, which must be obtained independently of the measurement of the absorption of the radio waves. In principle, as the author shows, the measurements of this absorption might be sufficient to determine the frequency of electron-electron impacts, but this could hardly be applied in actual practice, because the electron-electron impacts would have but very little influence upon the absorption in comparison with the electron-molecule impacts, unless the wavelength is very much larger than 200 m, and this does not seem to be of practical interest. The author suggests, however, that means for the measurements necessary for the calculation of the frequency of electron-molecule impacts in the ionized layers could be devised. *Subject Headings:* **1. Ionospheric absorption 2. Electron frequencies.**—*Physics Abstracts, No. 338, 1953.*

6D–66 551.510.535:551.508.96

Grace, Clinton H. (*Penna. St. Col. Ionos. Res. Lab.*), **High-power manually-operated vertical incidence ionospheric height measuring equipment.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 22, June 25, 1951. 39 p. 17 figs., 4 refs. **DWB**—Detailed description in text, photos and block diagrams of the new and modified measuring equipment used to determine the vertical incidence equivalent height of ionosphere layers by the Breit-Tuve method. The equipment is capable of operating continuously from 250 kc/s to 5 Mc/s in several bands. Peak power output approaches 100 kw. *Subject Headings:* **1. Ionospheric height measurement 2. Radio wave propagation 3. Ionospheric measuring equipment.**—*W.N.*

6D–67 551.510.535:621.396

Groenewold, H. J. (*Royal Netherlands Met. Inst., De Bilt*), **Triple splitting in a regular layer.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. 1951. p. 201–205. 8 refs., 8 eqs. **DWB**—Solution to equations to account for observed types of triple splitting of the ionospheric layer in mid-latitudes. Like reflection, it is explained as coupling between elementary ray solutions. For vertical incidence Bremmer's solution is presented in a more tractable form. *Subject Headings:* **1. Ionospheric stratification 2. Triple splitting in ionosphere 3. Ionospheric propagation.**—*From author's introduction.*

6D–68 551.510.535:551.543:523.3

Hagihara, Y., **The semi-diurnal lunar variations in the F2-layer.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. 1951. p. 99–100. table. **DWB**—Brief note accompanying table of the amplitude and phase of the M2 tide in the F2 layer for solstices and equinoxes, based on data on height of maximum ionization level at Kokubunji, Japan (139°E, 42°N) for Jan. 1947–Feb. 1948. *Subject Headings:* **1. F layer tides 2. Ionospheric semidiurnal lunar tides 3. Kokubunji, Japan.**—*M.R.*

6D–69 551.510.535:621.396

Hines, C. O., **Wave packets, the Poynting vector, and energy flow, Pt. 4, Poynting and Macdonald velocities in dissipative anisotropic media (conclusion).** *Journal of Geophysical Research*, 56(4):535–544, Dec. 1951. 11 refs., 24 eqs. **DLC**—Deals with the path of electromagnetic energy flow in media of complex nature (propagation of radio signals in the ionosphere). Direction obtained by POYNTING's or MACDONALD's methods shows a discrepancy with that found by the probably more reliable packet method. (For Pts. 1–3 *see item* 4.5–239, May 1953, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Ionosphere.**—*A.A.*

6D–70 551.510.535(08)

International Council of Scientific Unions. Mixed Commission on Ionosphere, 2nd Meeting, Brussels, Sept. 1950, **Proceedings.** Brussels, Pub. by the Council, 1951. 230 p. figs., tables,

efs., eqs. **DWB**—The Mixed Commission on the Ionosphere consists of members from the International Scientific Radio Union, the I.U.G.G., the International Astronomical Union and the International Union of Pure and Applied Physics. Over 30 papers on the ionosphere, aurora and upper atmospheric investigations and theory which were read at the 1950 meeting in connection with the meeting of the I.U.G.G. in Brussels, are presented in English, with illustrative material included. Minutes of the sessions of the 4th and 6th of Sept. 1950, names of members, those attending, and discussions of papers, Commission resolutions and a proposal for an International Polar Year (1957/8) are included. Each paper has been abstracted separately and many are included in this bibliography. *Subject Headings:* **1. Ionospheric symposia 2. Ionospheric physics conferences.**—*M.R.*

6D–71 551.510.535:523.74

*Japan. Science Council. Ionosphere Research Committee. **Catalogue of disturbances in ionosphere, geomagnetic field, field intensity of radio wave, cosmic ray, solar phenomena and other related phenomena, No. 10, the 31st cooperative observation, June 10–July 10, 1951.** [1951?] 39 p. graphs, tables. **DWB**—This observation period is especially interesting owing to a great solar eruption with two severe magnetic storms and a conspicuous decrease of cosmic ray intensity. A photo of the eruption is added and the observation results are presented in numerous graphs and tables. *Subject Headings:* **1. Solar phenomena 2. Ionospheric disturbances 3. Magnetic storms 4. Cosmic ray intensity 5. Japan.**—*A.A.*

6D–72 551.510.535

Jones, M. W. and Jones, J. G. (*Univ. of Alaska*), **Tides in the F-layer.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 105–107. 2 figs. **DWB**—During the winter only a thin F layer of low electron density and no F1 layer are present at College, Alaska. A graph of the semi-thickness of the F layer showed a cyclic period of about 12 hours. The solar diurnal wave reaches maximum amplitude of 17 km near noon, and the semidiurnal wave a maximum of 10 km near 4 hours and 16 hours. The less important lunar semi-diurnal wave has maximum amplitude of 25 km about 6 hours after lunar culminations. No lunar diurnal tide has been fixed as yet. *Subject Headings:* **1. F layer tides 2. College, Alaska.**—*M.R.*

6D–73 551.510.535:551.543

Jones, M. W. and Jones, J. G., **Report on tidal movements in the F-layer relative to tidal variations of surface pressure.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 107–109. fig., 3 refs. **DWB**—Surface barometric pressure at Fairbanks (College), Alaska was analyzed harmonically for Oct. 1948–March 1949 in order to take out the 2-hourly components of solar tides and the natural 12 h period of the atmosphere. The solar semidiurnal components of pressure are compared with F layer semi-thickness oscillations and found to be 180° out of phase if electron density is a function of pressure in the F region. If tidal winds (MARTYN's theory) are impossible for F layer variations, then the pressure patterns in the F region and on the ground are in phase. *Subject Headings:* **1. Ionospheric pressure 2. Ionospheric wind theory 3. F layer tides 4. College, Alaska.**—*M.R.*

6D–74 551.510.535:550.385

Kato, Yoshio (*Geoph. Inst., Tohoku Univ.*), **Further notes on a new theory of magnetic storm.** *Japan. Science Council, Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 5(2):75–83, **1951.** 6 figs., 2 refs. **DWB.** Also in: *Sendai, Japan. Tohoku Univ., Science Reports, 5th Ser., Geophysics*, 5(3):75–84, Dec. **1953. MH-BH**—Results obtained from recordings made with an induction magnetograph at Onagawa, Japan, since 1947, are reported and analyzed. A brief description of the instrument is given. Some records of storms are reproduced and commented on and general conclusions drawn as to the cause of magnetic storms in their various phases. In a brief discussion T. NAGATA (*ed.*) suggests that the author should offer positive evidence to support his assumption that the initial phase of magnetic storms is caused by ionization resulting from ultraviolet radiation. *Subject Headings:* **1. Magnetic storms 2. Ionospheric research 3. Ultraviolet radiation 4. Onagawa, Japan.**—*G.T.*

6D–75 551.510.535:523.78:621.396

Kato, Yoshio; Kamiyama, Hiroshi and Kikuchi, Takehiko, **Report on the result of the observation of the signal strength during the partial solar eclipse of Sept. 12, 1950.** *Sendai, Japan. Tohoku Univ., Science Report, 5th Ser. Geophysics*, 3(2):53–56, Sept. **1951.** 3 figs., 2 tables. **DWB**—Measurements of the signal strength of radio waves were made during the half month in which the partial solar eclipse occurred in order to study the behavior of the lower ionosphere. *Subject Headings:* **1. Ionospheric research 2. Eclipse effects 3. Radio waves.**—*A.A.*

6D-76 550.38:551.510.535

Kato, Yoshio and Ossaka, Justo (*Geophys. Inst., Tohoku Univ.*), **Time variation of the earth's magnetic field at the time of bay disturbance.** *Sendai, Japan. Tohoku Univ., Science Reports, 5th Ser., Geophysics,* 3(3):111–113, Dec. **1951.** 6 figs., 4 refs. **MH-BH**—Cause of changes of dH/dt during initial state of magnetic bay disturbances attributed to fluctuation of intensity of ionospheric current systems, in turn caused by fluctuations in conductivity of ionosphere above the auroral zone, which in its turn is caused by corpuscular radiation from the sun. Data obtained at Opagawa Magnetic Observatory near Sindai analyzed and presented graphically. *Subject Headings:* **1. Magnetic disturbances 2. Ionospheric currents.**—*M.R.*

6D-77 551.510.535:535.5

Kelso, J. M.; Nearhoof, H. J.; Nertney, R. J. and Waynick, A. J. (*Ionos. Res. Lab., Penna. State Col.*), **The polarization of vertically incident long radio waves.** *Annales de Géophysique,* Paris, 7(4):215–244, **1951.** 2 figs., 20 refs., eqs. English and French summaries p. 215. **MH-BH**—The polarization of long electromagnetic waves in the ionosphere is considered. The analytical expressions relating $N-\nu$ distributions of the ionosphere to the characteristic polarizations are developed. The polarization of the electromagnetic waves leaving the ionosphere is treated in two ways. In Part I the wave is treated as a single magneto-ionic component. It is shown that under certain conditions the wave does behave as a single component which attains a "limiting polarization" at some N value, $N \neq 0$. It is shown, however, that this analysis "breaks down" under certain conditions and, in fact, wave polarizations occur which are not characteristic polarizations associated with any $N-\nu$ value. It is shown in Part II that a model consisting of electron D and E regions is capable of giving polarization results which are in good agreement with experiment. *Subject Headings:* **1. Ionospheric research 2. Electromagnetic waves 3. Polarization 4. Radio wave polarization.**—*Authors' abstract.*

6D-78 551.510.535:621.396

Kobayashi, Tsuneto (*Central Radio Wave Obs.*), **Comparison between the measured and calculated values of the field intensities of HF waves in long distance propagation.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 5(4):198–201, **1951.** 5 figs. **DWB**—Data from observations on Dec. 1950 and during the solar eclipse of Sept. 12, 1950 were used for this comparison. The agreement was fairly good for most cases. *Subject Headings:* **1. Ionospheric research 2. Radio wave propagation.**—*A.A.*

6D-79 551.510.535:016 551.5:06

†Laursen, Veggo (*comp.*), **Bibliography for the Second International Polar Year, 1932–33.** Copenhagen, I.M.O. Temporary Committee on the Liquidation of the Polar Year, 1932–1933, **1951.** 253 p. **DWB**—The references are arranged according to countries and according to main subjects. In the section on Radioelectricity (p. 236–241) will be found 80 references, many dealing with the subject of ionospheric propagation. (*Same item as* 4.1–28, Jan. 1953 and 6A–108, Jan. 1955, *M.A.B.*) *Subject Headings:* **1. Ionospheric propagation bibliographies 2. International Polar Year, 1932–1933 3. I.M.O. Temporary Committee on the Liquidation of the Polar Year.**—*M.L.R.*

6D-80 551.510.535:551.543:519.2

Maeda, K. and Izaki, M. (*Electr. Communicat. Lab., Min. of Telecom.*), **Some applications of mathematical statistics to the lunar tidal analysis of ionospheric height.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 5(4):179–181, **1951.** 2 tables. **DWB**—The significance of analyzed results for the lunar tide in ionospheric height is tested statistically and sample errors are given. *Subject Headings:* **1. Ionospheric, lunar variations 2. Lunar tides 3. Statistical studies.**—*A.A.*

6D-81 551.510.535:551.543

Martyn, D. F. (*Mt. Stromlo Obs. Canberra, Australia*), **Movements in the ionosphere.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings,* pub. **1951.** p. 31–38. 4 figs., eqs. **DWB**—Long and short period motions, tidal currents and other variations of the ionosphere are discussed and shown diagrammatically. *Subject Headings:* **1. Ionospheric tides 2. Ionospheric variations.**—*M.R.*

6D-82 551.510.535:551.594.12

Martyn, D. F., **Sporadic E ionization.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings,* pub. **1951.** p. 44–48. **DWB**—Three types of sporadic E ionization are distinguished—that due to (a) meteors or (b) magnetic corpuscles during storms in polar latitudes and (c) daytime sporadic E ionization in low latitudes. The latter type is discussed by the author and numerous other conferees. It occurs with maximum at midday

and in summer, but there is a secondary maximum (at Brisbane) in winter and two minima near equinoxes. This is explained as due to two types of ionization, one at 200 km (summer) with a drifting downward and accumulation of ions at 100 km, and a creation of ionization *in situ* at 100 km in winter. Tidal influence may prevail and also horizontal motions occur. *Subject Heading:* **1. Sporadic E ionization.**—*M.R.*

6D–83 551.510.535

†Massey, N. S. W. (*Univ. Coll., London*), **The formation of the ionosphere.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 9–31. 33 refs., eqs. **DWB**—Prevailing theories are reviewed and a model ionosphere comprising all of the characteristics (physical and chemical) presented. Points which must be cleared up by future research are elaborated on. Discussion by APPLETON, VEGARD, MASSEY, BERKNER, MAEDA and others given *in extenso*. *Subject Heading:* **1. Ionospheric models.**—*M.R.*

6D–84 551.510.535

Nagata, T. and Fukushima, N. (*Ionosphere Res. Com., Japan.*), **Ionospheric storms.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 112–113. **DWB**—Ionospheric disturbances are more common in summer than in winter, and in the daytime (except sporadic E ionization which occurs most often at midnight), in the mid-latitudes. Data from 5 Japanese stations were analyzed for disturbances and several peculiarities of the behavior of the change in daily sum of the hourly horizontal component (foF2) noted. The decrease in foF2 apparently begins about 12 hours after the sudden commencement, and the rate of decrease is larger at the northern stations and begins later at the southern stations. The velocity of propagation of the ionospheric storm was estimated at 300 km/hr. *Subject Headings:* **1. Ionospheric storms 2. Japan.**—*M.R.*

6D–85 551.510.535:621.396.812

***Nearhoof, H. J. (*Penna. St. Coll. Ionos. Res. Lab.*), **Tabulation of 150 Kc/s polarization data obtained at vertical incidence including their interpretation from the single magneto-ionic component viewpoint.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report No. 25, August 20, **1951.** 418 p. 23 figs., tables, 14 eqs. **DWB**—Theoretical methods are discussed which allow the determination of the electron density and the collisional frequency from the measurable polarization quantities as defined by the Appleton-Hartree equation. These methods are general in that they can be applied to any geographical location and to any operating frequency. Experimental results on 150 Kc/s are then interpreted using the above mentioned theoretical procedure by treating the downcoming echo as a single magneto-ionic component. The results are then applied to an assumed ionospheric model of Chapman shape and with an exponential ν curve fixed in space and independent of time. *Subject Headings:* **1. Ionospheric research 2. Electron density 3. Polarization.**—*Author's abstract.*

6D–86 551.510.535

***†Nertney, R. J. (*Penna. St. College. Ionos. Res. Lab.*), **Characteristics of the lower ionosphere as deduced from long wave measurements: preliminary.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 28, Sept. 20, **1951.** 46+p. 29 figs., 16 refs., eqs. **DWB**—The theory of obtaining wave solutions of ionospherically reflected waves (*see* Report No. 20 (1), 6D–87 and 27 (2), 6D–88) and 150 kc/s experimental data were used to determine diurnal and seasonal characteristics of the lower E and D region. The existence of certain "splits" may be explained without recourse to a very sharp strata layer. *Subject Headings:* **1. Ionospheric reflection 2. E region 3. D region.**—*W.N.*

6D–87 551.510.535:621.396

Nertney, R. J., **Method for obtaining the wave solutions of ionospherically reflected long radio waves including all variables and their height variations with preliminary applications.** Pennsylvania. State College. Ionosphere Research Laboratory. Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 20, March 15, **1951.** 65+12+8 p. 27 figs., 2 tables, 15 refs., eqs. **DWB**—Applies the "wave theory" specifically to the problem of obtaining the wave solutions of the uncoupled wave equation for 150 kc at vertical incidence over State College, Pa., whereby solutions were obtained for the "ordinary" component under some specified conditions. Wave functions for E layer fc = 0.55, 1.1, 2.2, 3.0 and 4.4 Mc and from which the calculations of the reflection coefficients are made. Extended dispersion calculations (*see* Report No. 10 (1) item 6D–36) in graphical representations of μ and x, ordinary and extraordinary waves for fc 3.0 Mc and the x values on the extraordinary wave for all fc values above are presented. Other calculations are made and the comparison made between theoretical and experimental results. Postulating a D

layer accountable for discrepancies, author presents two D layer models. *Subject Headings:* **1. Ionospheric reflection 2. Radio wave propagation.**—*W.N.*

6D–88 551.510.535:621.396

*Nertney, R. J., **Wave solutions, including coupling, of ionospherically reflected long radio waves including all variables and their height variations for a particular E region model.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 27, Sept. 10, 1951. 48+p. 26 figs., table. **DWB**—A consideration of the diurnal and seasonal E model (*see* Report No. 20, *item* 6D–87) that demonstrates how the method of "variation of parameters" is used to obtain approximate 150 kc/s solutions to the coupled wave equations. It is found that the coupling effects occur in the neighborhood of N = 300 electrons/cm³, and become greater for night time models, hence stronger split echoes and departure from circularity in polarization ellipses. Comparison between theoretical and experimental results shows good agreement. *Subject Headings:* **1. Ionospheric reflection 2. Radio wave propagation.** —*W.N.*

6D–89 551.510.535

O'Day, Marcus, **Super-altitude weather.** *Air University Quarterly Review*, 5(1):24–37, 1951/1952. 2 figs. **DLC**—A useful semipopular outline of the results of research and of contemplated research program is given. The scientific activity of the U. S. Air Force in this field is described. *Subject Headings:* **1. Upper atmosphere 2. Ionospheric research 3. Rocket measurements 4. U. S. Air Force.**—*A.A.*

6D–90 551.510.535:621.396.812.3

Pennsylvania. State College. Ionosphere Research Laboratory, **Basic ionospheric research.** Contract AF 19(122)-44, Quarterly Report, Nos. 2–10, June 16/Sept. 8, 1949 to May 24/Aug. 24, 1951. 9 pieces. figs., refs. **DWB**—The quarterly reports No. 2–10 deal with the work and progress on:

Problem 1 A, Procurement and interpretation of 150 kc/s equivalent height versus time recording
Problem 2 A, Procurement and interpretation of 150 kc/s vertical incidence ionospheric absorption data
Problem 3 A, Equipment development for oblique incidence measurements in the frequency range from 100 kc/s to 500 kc/s
Problem 5 A, Long wave literature survey abstracting and bibliography
Problem 6 A, Long wave theoretical development
Problem 7 A, Long wave exploratory work
Problem 8 B, $h'-f$ recordings
Problem 9 B, WWV field strength recordings
Problem 12 B, Theoretical development based on the double parabola theory
Problem 13 B, Short wave exploratory work
Problem 16 A, Oblique incidence measurement at 150 kc/s
Problem 18 A, Long wave ionospheric absorption
Problem 19 A, Long wave equipment development
Problem 21 A, 150 kc/s sky-wave polarization
Problem 23 B, Oblique incidence $P'-f$ experiment
Problem 24 B, E layer characteristics under quiet and disturbed conditions
Problem 28 A, Lunar tide study

Reprints of papers by the project personnel are included in some of reports. Conferences, visits, papers published and reports issued in the course of the periods are listed. Rosters of personnel are included. *Subject Headings:* **1. Ionospheric research 2. Radio wave propagation 3. Long waves 4. Short waves. I. Waynick, Arthur Henry.**—*W.N.*

6D–91 551.510.535:538.566:016

†Pennsylvania. State College. Ionosphere Research Laboratory. **Survey of the literature of the ionosphere pertaining to long waves.** Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 23, July 10, 1951. 268 p. **DWB**—This bibliography is comprised of abstracts and references to the literature of the ionosphere and a portion of the upper atmosphere. Attention has been largely confined to the published work concerning long waves and the levels in height where the upper atmospheric physical characteristics affect the passage of such waves. While, as mentioned above, the emphasis has been placed on long wave and associated literature, many survey papers and some of historical interest are included. Similarly, relevant work in physics and mathematics

are considered. (*Same item as* 6B–103, Feb. 1955, *MAB.*) *Subject Headings:* **1. Ionosphere bibliographies 2. Long waves 3. Radio wave propagation.**—*From author's abstract.*

6D–92 551.510.535:551.594.12

Ratcliffe, J. A., **A quick method for analysing ionospheric records.** *Journal of Geophysical Research*, 56(4):463–485, Dec. **1951.** 17 figs., 10 refs., 19 eqs. **DWB**—Approximate method developed in order to give quick information about the vertical distribution of electron density in ionosphere. Assuming that the earth's magnetic field is zero and a parabolic distribution of electrons, a series of curves is constructed on a transparent scale. Applying it to photographic records the desired parameters can be read directly from the scale. *Subject Headings:* **1. Ionospheric analysis 2. Ionospheric records 3. Electron density.**—*A.A.*

6D–93 551.510.535:594.12

Ratcliffe, J. A., **Some regularities in the F2 region of the ionosphere.** *Journal of Geophysical Research*, 56(4):487–507, Dec. **1951.** 11 figs., 11 refs. **DWB**—Study based on records made at three stations (Watheroo, Australia; Huancayo, Peru; College, Alaska) for two magnetically quiet days per month in a year of sunspot maximum. The number of electrons per unit column (n) in the F2 layer below the maximum is closely related to the sun's zenith angle. Diurnal, seasonal and geographical anomalies of the maximum electron density in the F2 layer disappeared when the quantity n was studied instead. *Subject Headings:* **1. F2 layer 2. Electron density.**—*A.A.*

6D–94 551.510.535

Rydbeck, O. E. H. (*Chalmers Univ. of Technology, Gothenburg, Sweden*), **Magnetic ionic triple splitting.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 182–201. 16 figs., 6 refs., 9 eqs. **DWB**—A fundamental paper giving a summary of the theory and results of detailed investigations of the mechanism of excitation of the E and F layer triple splits (third mode or Z-trace) which appear on ionospheric records. The data are taken from records made at the Kiruna Ionospheric and Radio Wave Propagation Observatory at 67°50′N and 20°14′E. Graphs show variation of critical collisional frequency with geomagnetic latitude and illustrative recorder records of triple splits. It is not necessary to assume any sudden change in electron density with height to explain the phenomenon. A more detailed report is given by the author in 1950 paper. *Subject Headings:* **1. Ionospheric stratification 2. Triple splitting in ionosphere.**—*M.R.*

6D–95 551.510.535:621.396

Saha, M. N.; Banerjea, B. K. and Guha, U. C., **Vertical propagation of electromagnetic waves in the ionosphere.** *National Institute of Sciences of India, Proceedings*, 17(3):205–226, May/June **1951.** 8 figs., 3 tables, 11 refs., 3 eqs. **DWB**—A theoretical and detailed discussion of various equations for the vertical propagation of radio waves in the ionosphere, with stress on the nature of the modification at high latitudes. The coupling term ϕ and the polarization quantities p_1 and p_2 are discussed in minute detail whereas the two refractive indices q_0 and q_e are not discussed as they were previously treated in detail by other workers. It is shown that ϕ can be neglected anywhere, except very close to the geomagnetic poles, so far as F layer propagation is concerned, but E layer propagation is more complicated. As an exact treatment of the differential equation is yet to be made, the nature of the modification of propagation as a function of ϕ on the triple splitting cannot be definitely stated. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*W.N.*

6D–96 551.510.535

Seaton, S. L., **The ionosphere.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 334–340. 3 figs., 4 refs., 6 eqs.) **MH-BH**—A general outline of the structure of the ionosphere as well as the history and methods of investigation are given for meteorologists not familiar with the research work in this field. Despite the fact that GAUSS showed that there should be a region of high electrical conductivity in the upper atmosphere, the direct evidence of this region was obtained only in 1925. The probable distribution of ionization is shown and the occurrence of the different regions is discussed. Above the F2 region a G region may be present. The author states that from the meteorological standpoint the ionosphere appears to have immense possibilities, but no sure results have as yet been obtained. The ionospheric temperatures are not known sufficiently, but it is probable that the temperature variations are very great. (*Same item as* 3.11–7, Nov. 1952, *MAB.*) *Subject Heading:* **1. Ionosphere.**—*A.A.*

6D–97 551.510.535:621.396

Srivastava, J. P. and Rajan, V. D., **Anomalous variations in the angle of downcoming radio waves and their bearing on the fading of short wave signals.** *Indian Journal of Physics*, 25(6):287–297, June **1951.** 9 figs., table, 5 refs., 8 eqs. **DLC**—A detailed study of the problems of angle of

arrivals and intensity variations of short-waves between the 16 and 41 m band. Cause and effect of circumstances resulting in abnormal values are discussed. Single and double reflected waves give normal values of angles whereas rays arising from magneto-ionic splitting give anomalous variation and values of angle. Observational examples are presented. *Subject Headings:* **1. Ionospheric reflection 2. Radio fading.**—*W.N.*

6D–98 551.510.535:621.396

*Tantry, B. A. P. and Khastgir, S. R., **Studies in fading of medium wave radio signals.** *Indian Journal of Physics*, 25(5):217–232, May **1951.** 12 figs., 4 tables, 13 refs., eqs. **DLC**—Evening and early night hour data are presented in curves and tables. Two types of fading pattern were observed: (1) Periodic or quasi-periodic with distinct slow and quick periods, of which the slow one is attributed to ionospheric interference described by APPLETON and BEYNON (1947) whereas the quick one is considered due to the vertical movement of the ionospheric layer that usually occurs at night. The Doppler-beat interpretation (order 3, 5 m/sec) and expression for the periodicity are given. (2) Random fading. The analysis disagrees with Rayleigh's formulas, possibly explainable by the existence of rays following slightly different paths. Observations of more than one peak (for distant stations) in the distribution curve must be due to single and double E layer reflections. *Subject Headings:* **1. Ionospheric reflection 2. Radio fading 3. India.**—*W.N.*

6D–99 551.510.535:550.381

Tufts College. Dept. of Physics, **Construction of a toroid-like discharge tube with a co-annular magnetic field to reduce loss of ions to the walls by diffusion.** Contract AF 19(122)-89, Quarterly Progress Report, No. 8, June 15, **1951.** 31 p. 4 plates, 6 refs. **DWB**—Report describes equipment under construction at Tufts College in collaboration with the Geophysical Research Directorate, for studying electronic and ionic processes in atmospheric gases, under conditions which simulate conditions in the ionosphere. A large copper toroid with a magnetic field of 1500–3000 oersteds is described and practical as well as theoretical problems connected therewith are analyzed and illustrated. *Subject Headings:* **1. Ionospheric research apparatus 2. Copper-toroid discharge tube. I. Mingins, Charles R. II. Bostick, Winston H.**—*M.R.*

6D–100 551.510.535:621.396

Vassy, Étienne (*Prof., Faculté des Sciences de Paris*), **Perturbation apportées par l'atmosphère aux aides à la navigation.** [Disturbing effects of the atmosphere on navigation aids.] *L'Onde Électrique*, Paris, No. 295:379–383, Oct. **1951.** 8 figs., 13 refs. Abstracted from reprint. **DWB**—Disturbing effects on radio communication are summarized. Author takes up first the effect of the inclination of the ionized layers, of inhomogeneous ionization along the trajectories and of absorption and diffusion in the ionosphere and then discusses disturbances due to the troposphere (lateral refraction, conductivity and diffusion phenomena). *Subject Headings:* **1. Radio wave propagation 2. Ionospheric disturbances.**—*A.A.*

6D–101 551.510.535

Waynick, A. H. (*Penna. St. Coll., Pa.*), **Studies of the ionosphere using very long wave pulse techniques.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 161–165. **DWB**—Results of vertical incidence equipment height records made at Penn State College from March 1949–April 1950 and vertical incidence absorption records with semi-automatic equipment since April 1950, and vertical incidence polarization measurements since late spring 1950, are summarized and equipment described. *Subject Headings:* **1. Vertical incidence records 2. Ionospheric records.**—*M.R.*

6D–102 551.510.535:551.508.96

Wells, H. W., **Spot-frequency ionospheric recording: a combination of sweep- and fixed-frequency techniques.** *Journal of Geophysical Research*, 56(4):613–615, Dec. **1951.** 2 figs. **DLC**—The panoramic high-speed ionospheric records are quite useful for the study of ionospheric irregularities, traveling disturbances and eclipse observations, but produce such tremendous amounts of data (3,600 in 10 sec.) that nobody can keep up with the evaluation of the results. The author proposes a simplified sampling technique which gives a complete tabulation of virtual ionosphere heights with a minimum of scaling effort. *Subject Headings:* **1. Ionospheric recorders 2. Sampling techniques.**—*A.A.*

6D–103 550.384.4:551.557:551.510.535

Wiese, H., **Anomalien des täglichen Ganges im Erdmagnetismus und ihr Zusammenhang mit den Windströmungen der tiefen Ionosphäre.** [Anomalies of the diurnal variation of terrestrial magnetism and their relation to the wind currents of the lower ionosphere.] *Zeitschrift für Meteorologie* 5(12):373–377, Dec. **1951.** 5 figs., 11 refs. **DWB**—The diurnal variation of the com-

ponents X, Y, Z of the geomagnetic field at Potsdam on quiet days in different months and years are examined and peculiarities of annual variation of amplitude and phase noted. These are related to the diurnal wind system in the ionosphere, which varies in strength with the seasonal variation of radiation and also with slow changes of great stationary circulations. This is discussed in relation to drift of luminous night clouds. *Subject Headings:* **1. Ionospheric winds 2. Magnetic variations.** —*C.E.P.B.*

6D–104 551.510.535:546.214 551.508.95

*Wilson, William S.; Lowrey, R. D.; Katzenstein, Jack; Bauer, John R. et al, **State of the earth's atmosphere in the Arctic.** Alaska. University. Geophysical Insitute, Contract W-28-099ac-445, Research Report, No. 11, Feb. 15, **1951.** 15 p. Pt. I, Bauer, John R. and Katzenstein, Jack, **The searchlight technique for exploring the atmosphere.** Pt. II, Katzenstein, Jack, **Measurement of cosmic ray intensity in the Arctic.** Pt. III, Lowrey, R. D. and Wilson, William S., **The chemical determination of the amount of ozone in the air at the earth's surface at College, Alaska. DWB**— In Pt. I, the searchlight equipment being tested for upper atmosphere soundings by optical methods is described and illustrated. In Pt. II, symmetry of the heights and critical frequencies of the ionospheric E and F layers as shown by monthly data recorded in many parts of the world, with respect to magnetic rather than geographic poles, leads to the questioning of the theory that ionization in these layers is due to ultraviolet light and to suspicion that charged particles are the cause. In Pt. III, ozone data measured at the ground are presented and analyzed. *Subject Headings:* **1. Ionospheric research 2. Searchlight soundings 3. Ozone measurement techniques 4. Chemical ozone determination 5. College, Alaska.**—*M.R.*

6D–105 551.510.535:550.386:551.557

Wiese, H., **Die erdmagnetischen Bays und ihre Beziehungen zu den Strömungsverhältnissen der Ionosphäre.** [Geomagnetic bays and their relations to the currents of the ionosphere.] *Zeitschrift für Meteorologie*, 5(11):341–347, Nov. **1951.** 7 figs., 5 tables, 13 refs. **MH-BH**—The diurnal and annual variation of the frequency of bay-disturbances in the records of the Magnetic Observatory at Niemegk are investigated, 1937–1944. 27-day and local 24-hour recurrences are demonstrated. Frequency is greater in winter than in summer. The 24-hour recurrence is attributed to a daily wind in the ionosphere, which is connected with the broad-weather type at lower levels, especially in winter. Bays are most frequent with westerly and anticyclonic types in Central Europe. *Subject Headings:* **1. Terrestrial magnetism 2. Ionosphere.**—*C.E.P.B.*

6D–106 551.510.535:523.7:621.396.8

Wyatt, Catherine B. (*Harvard Univ.*), **An index of coronal line emission integrated over the solar disk.** Harvard University, Contract W 19-122-ac-17, The establishment of a solar observatory at Sacramento Peak, New Mexico, Special Report, No. 36, March 12, **1951.** 32 p. 5 figs., tables, 8 refs. **DWB**—Methods of defining coronal daily indexes were adopted as standard for the green and red emission lines. Correlation coefficients were computed between the coronal indexes and the total sunspot number, floccular area, monthly mean values of coronal indexes and sunspot areas, radio noise, seasonal changes, and the critical frequencies of the ionospheric F2 layer measured at Washington, D. C. Further correlations were computed between other defined quantities. Both solar and terrestrial characteristics were unreliable due to uncertainties in the coronal index, disk and ionospheric measurement. A definite correlation was noted with solar radio noise recorded at 480 mc. The corona seems to be more intense at the maximum of the solar cycle. *Subject Headings:* **1. Solar physics 2. Sun's corona 3. Solar radio noise 4. F2 layer.**—*TIP No. U19740.*

6D–107 551.510.535

Yonezawa, Toshiyuki (*Japan, Central Radio Prop. Obs.*), **On some results of ionosphere study.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, Brussels, Sept. 1950, Proceedings*, pub. **1951.** p. 206–207. **DWB**—Brief discussion of: 1) absorption of radio waves in ionosphere (about 20% in E layer and nearly 100% in F layer) due to ions and relation to estimates of upper air density; 2) recombination coefficients obtained from analysis of F2 layer electron density variation during a solar eclipse (Feb. 5, 1943 in Hokkaido); 3) a new method of obtaining values of recombination coefficients (doesn't work very well) and 4) values of recombination coefficients obtained from night electron density variations of F2 layer, considering temperature change [α-maximum 3.3 in Dec. and minimum 0.3 ($\times 10^{-10}$ cm^3 sec^{-1}) in June and July]; a seasonal variation of 11:1. *Subject Headings:* **1. Recombination coefficients 2. Ionospheric density.**—*M.R.*

6D–108 551.510.535

Yonezawa, Toshiyuki, **On the fluctuation in height of the F2 layer during the night.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 5(4):203–204, 1951. **DWB**—Short discussion of observation results, obtained during the 29th co-operative observation period from March 10, to April 10, 1951. The height of F2 showed a marked variability

(in many cases over 80 km in one hour). The autocorrelation coefficient with the height after one hour was 0.44, while this value for the electron density was 0.73. The correlation coefficient between simultaneous observations at two stations with a distance of more than 1000 km was 0.35. *Subject Headings:* **1. Ionosphere 2. F2 layer variability.**—*A.A.*

1952

6D–109 551.510.535:621.396.11

*Bain, W. C.; Bracewell, R. N.; Straker, T. W. and Westcott, C. H., **The ionospheric propagation of radio waves of frequency 16 kc/s over distances of about 540 km.** *Institution of Electrical Engineers, Proceedings*, pt. 4, 99(3):250–259, July **1952.** 11 figs., 2 tables, 19 refs., 9 eqs. **DBS**—Previous measurements over 90–200 km distances when compared with experimental results obtained over a distance of 535 km show a marked change in the propagation characteristics of waves at 16 kc/s frequency. The height of reflection varies with the inclination of the sun's rays. From 90–535 km the apparent height is about 74 km at midday and about 92 km at night. Experimental results are discussed and presented in tables. *Subject Headings:* **1. Ionospheric reflection 2. Radio wave propagation.**—*W.N.*

6D–110 551.510.535

Baral, S. S. (*Ionospheric Lab., Inst. of Radio Phy. and Electronics, Univ. Col. of Sci., Calcutta*), **Studies on sporadic E.** *Journal of Scientific and Industrial Research*, New Delhi, Sec. A, 11(7):290–296, July **1952.** 4 figs., 26 refs. **DWB**—Author discusses the results of his analysis of world data, 1945–1951, available on sporadic E (Es) of which the highlights are: 1. The main source of Es ionization is the meteoric impacts. 2. Both intensity and frequency of occurrence have two maxima: (a) one near the equator and (b) another near 70° lat. The author speculates on whether or not the pronounced effect found over the geomagnetic equator has some bearing on the upper atmospheric (electro-jet) current system over Huancayo. 3. The diurnal variation of Es falls off from the equator towards the higher latitudes. 4. Of the two theories of the structure of the Es, the "thin layer" and the "ionized patch," the latter is strongly favored because of observational evidence. *Subject Heading:* **1. Sporadic E layer.**—*W.N.*

6D–111 551.510.535:523.74:621.396.81

Bartha, Lajos and Piret, Endre, **Adatok a Nap felületi jelenségeinek és a rádió-fadingok összefüggésének vizsgálâtahoz.** [Data on the correlation between solar activity and radio fading.] *Időjárás*, 56(11/12):363–373, Nov./Dec. **1952.** 5 figs., table, refs. Russian and French summaries p. 392–393. **DLC**—Simultaneous observations of intensity and position of sunspots and faculae and of radio fade-out (with commercial radio receivers in the lower bands of the medium-wave range) have been conducted in Hungary since May 1952. Results are presented in a table and graphs. The principal conclusions are the following: 1) minor fade-outs are independent of solar activity; 2) there is a marked correlation between strong ionospheric variations (caused by changes in solar radiation rather than by its absolute intensity) and solar activity; 3) maximum ionospheric disturbance occurs approximately 30 hrs after solar active regions cross the solar meridian, attributable to the relatively slow propagation of solar corpuscular emission and 4) major faculae cause strong ionospheric disturbance. *Subject Headings:* **1. Solar influences 2. Ionospheric disturbances 3. Radio fading.**—*G.T.*

6D–112 551.510.535:551.501.9

Beagley, J. W. (*Dir. Geophysical Obs., Dept. of Sci. & Ind. Res. N. Z.*), **Ionosphere research.** (In Simpson, Frank A., (*ed.*) **The Antarctic today.** Wellington, Reed, **1952.** p. 279–293. fig., photos, 15 refs.) **DWB**—A survey of the research which has been and is being done in New Zealand and the neighboring Antarctic regions in an attempt to solve the fundamental problems of ionospheric research. First proof of the Kennelly-Heaviside layer is said to have been made by APPLETON and BARNETT (a New Zealander) in 1924 (*see item* 6D–6). The places where research on ionospheric wave propagation is carried on are listed and the work described (Christchurch, Raoul Island in Kermadec Group, Campbell Island, Pitcairn Island, Rarotonga, Fiji). Plates show the layout of the weather station on Marion Island. *Subject Headings:* **1. Ionospheric research stations 2. New Zealand Region 3. Marion Island. I. Barnett, M. A. F.**—*M.R.*

6D–113 551.510.535:621.396

Booker, H. G. (*Cornell Univ., Ithaca, N. Y.*), **Atmospheric scattering of radio waves, with an application to radio astronomy** [and discussion]. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 11:171–174, **1952.** 7 refs. **DWB**—A theory of atmospheric scattering (after BOOKER and GORDON, 1950) is applied to the ionosphere in the hope of explaining "scattering in the E region, auroral phenomena and scattering in the F region at times of ionospheric

storms." The scattering of radio waves by isotropic turbulence in the ionosphere is considered. *Subject Headings:* **1. Clear air turbulence 2. Ionosphere 3. Scattering of radio waves.**—*M.R.*

6D–114 551.510.535:621.396.11

Bracewell, R. N., **The ionospheric propagation of radio waves of frequency 16 kc/s over distance of about 200 km.** *Institution of Electrical Engineers, Pt. 4, Proceedings,* 99(3):217–228, July **1952.** 16 figs., 11 refs. **DBS.** Digest version: *Ibid.,* Pt. 3, 99(60):217–221, July **1952.** 6 figs., 11 refs. **DLC**—Features an experimental technique of phase measurement achieved by comparison with a reference signal from transmitter to receiver by land line. It is an extended investigation of 16 kc/s waves over 90 km that began in 1946 and gives results of the experiments carried out at distances up to 200 km. *Subject Headings:* **1. Ionosphere 2. Radio wave propagation.**—*W.N.*

6D–115 621.396.81:551.510.535:551.594.7

Budden, K. G., **The theory of the limiting polarization of radio waves reflected from the ionosphere.** *Royal Society of London, Proceedings,* 215(1121):215–233, Nov. 25, **1952.** 2 figs., 10 refs., 97 eqs. **DLC**—Based on FÖRSTERLING's coupled wave equation (vertical incidence), equations are obtained by which a solution representing a single characteristic downcoming wave above the limiting region gives criteria for determination of the limiting polarization when the wave reaches the ground. Discussion of the application of the theory to frequencies higher than 1 Mc/s furnishes no new information of significance about the ionosphere. *Subject Headings:* **1. Ionospheric reflection 2. Radio wave polarization.**—*W.N.*

6D–116 551.510.535:621.396.81:523.72

Burgess, R. E. and Fowler, C. S., **Solar activity and ionospheric effects. Comparison from May to November 1948.** *Wireless Engineer,* London, 29(341):46–50, Feb. **1952.** 4 figs., table, 3 refs. **DLC**—Observations of ionospheric propagation conditions on long waves (191 kc/s) and short waves (18.89 Mc/s) were compared with observations of solar noise bursts (on 30, 42, 73 and 155 Mc/s) and with the appearance of solar flares and sunspots. Detailed study of the correlation between these phenomena was made and statistical conclusions are presented. *Subject Headings:* **1. Radio wave propagation 2. Solar influences.**—*M.L.R.*

6D–117 551.510.535:551.594.7

Cutolo, M., **Determinazione sperimentale delle curve di risonanza nel moto degli elettroni lenti dell' alta atmosfera.** [The experimental determination of the resonance curve in the motion of slow electrons in the upper atmosphere.] *Il Nuovo Cimento,* 9th Ser., 9(5):391–406, May 1, **1952.** 6 figs., 2 tables, 9 refs. English summary p. 406. **DWB**—Review of "cross modulation" in the ionosphere between two electric waves of very different frequencies. The cross modulation is especially well expressed if the frequency of the modulated wave is about equal to the local gyrofrequency—a resonance effect called "gyro interaction." Italian observations show an appreciable influence of the sunspots on this phenomenon. *Subject Headings:* **1. Radio wave propagation 2. Ionosphere 3. Sunspot effects.**—*A.A.*

6D–118 551.594.7:538.56

Cutolo, M., **Su di un nuovo fenomeno di interazione fra onde ed elettroni liberi sottoposti al campo magnetico terrestre.** [On a new phenomenon of interaction between waves and electrons subjected to the field of terrestrial magnetism.] *Il Nuovo Cimento,* 9th Ser., 9(8):687–698, Aug. **1952.** 3 figs., 2 tables. English summary p. 698. **DLC**—The curious phenomenon of a wave with frequency near the gyrofrequency that interacts on itself is discussed and nomenclature suggested. Graphical presentation on how the modulation per cent of the received radiation decreased to less than 40% of the originally transmitted 80% is given. Technical difficulties retarded exact measurements of the frequency at which the minimum was obtained hence the determination as to whether or not the values were higher or lower than the calculated gyrofrequency, because of ionospheric conditions, remains unsolved. *Subject Heading:* **1. Anomalous radio propagation.**—*W.N.*

6D–119 551.510.535:551.594.7

*Davids, Norman (*Penna. St. Coll., Ionosphere Res. Lab.*), **Dispersion effects at 150 Kc/s a particular E-layer model.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Ionospheric Research, Scientific Report, No. 31, Jan. 30, **1952.** 62 p. 9 figs., 3 tables, 9 refs., 48 eqs. Appendix A, p. 35–62, Schrag, R. L., **Magneto-ionic calculations for a nighttime E-layer model at 140, 150, and 160 Kc/s. DWB.** *Subject Headings:* **1. Ionosphere 2. Radio wave propagation 3. Dispersion effects. I. Schrag, R. L.**

6D–120 551.510.535:523.78

Estrabaud, S., **Mesures ionosphériques effectuées a Bangui lors de l'éclipse solaire du 25 février 1952.** [Ionospheric measurements made at Bangui during the solar eclipse of Feb. 25,

1952.] *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26,* **1952,** *Proceedings,* pub. 1953. p. 34–38. 3 figs. **DWB**—The results (preliminary) of the ionospheric observations (soundings and some measurements of echo amplitude) carried out during 10 days preceding and following the eclipse and concerning mainly the E1 and F2 regions are presented and discussed. They deal with the degree of ionization caused by the phenomenon, the value of apparent recombination coefficient and the seeming apparition of a second F2 layer. *Subject Headings:* **1. Ionospheric measurements 2. Solar eclipses 3. Bangui, French Equatorial Africa.**—*A.M.P.*

6D–121 551.510.535:621.396

Friedman, Bernard and Russek, Joy (*N. Y. Univ. Wash. Square Coll.*), **Addition theorems for spherical waves.** N. Y. University. Washington Square College of Arts and Science. Mathematics Research Group, Contract AF 19(122)-42, Research Report, No. EM-44, June **1952.** 19 p. 10 refs., 39 eqs. **DWB**—Expansions or "addition theorems" for the spherical wave functions: $J_n(KR)P_n^{(m)}$ (Cos O) $e^{im\phi}$, $h_n^{(1)}(KR)P_n^{(m)}$ (Cos $O)_e{}^{im\phi}$ and $h_n(2)\ (KR)P_n^{(m)}$ (Cos $O)_e{}^{im\phi}$. With reference to the origin O, have been obtained in terms of spherical wave functions with reference to the origin O; where O' has the coordinates $(h_o, O_o\phi_o)$ with respect to O. Using the above mentioned addition theorems, we have obtained an expansion for $e^{ikr_{12}}/r_{12}$ a wave which is spherically symmetric about the source Q, where Q is referred to the origin O, in terms of products of spherical waves with respect to origin O and spherical waves with respect to O'. *Subject Headings:* **1. Ionosphere 2. Radio wave propagation.**—*Authors' abstract.*

6D–122 551.510.535:551.594.7

Gibbons, J. J., and Bellas, F. E., **Pt. I. A method of treating the plane wave equation. Pt. II. The coupling problem at 150KC/SEC.** Pennsylvania. State College, Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 42, Oct. 15, **1952.** 22 p. 2 figs., 5 refs., 16 eqs. **DWB**—This report is concerned with two separate topics: (1) a method of attacking the wave equation in an inhomogeneous medium and (2) a method of reducing the coupling between ionospheric modes, so as to treat the coupling problem as one of regular reflection due to a variation in refractive index. It was first thought that the method of (1) would be applied to the coupling problem (2), but actual calculation showed this to be pointless; the solutions were so closely W.K.B. that the problem would be no test of any practical computation method. Moreover, some questions of boundary conditions in problem (1) are not yet settled; we prefer to consider that part of the report as a preliminary investigation. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*Authors' abstract.*

6D–123 621.396:551.510.535

Hess, H. A., **Investigations of high-frequency echoes, Pt. 3.** *Institute of Radio Engineers, N. Y., Proceedings,* 40(9):1065 1068, Sept. **1952.** 4 figs., 6 refs. **DLC**—The author gives a detailed account of radio wave propagation carried out in Germany in Nov. 1944, on a frequency of 19,947 kc. First and second circuits (around the globe) and signals reflected from the ionosphere were recorded and timed. Original records of the received signals are reproduced and time-amplitude curves presented. Around-the-globe trajectories of radio waves are shown in a diagram representing them as a beam of great circle lines with intersections at antipodal points. The ratio between the circuit period and the height of the reflecting F2 layer is graphically represented. (For Pts. 1 and 2 *see I.R.E., Proceedings,* 36:981–992, Aug. 1948 and 37:986–989, Sept. 1949.) *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection 3. Germany.**—*G.T.*

6D–124 621.396:523.74

Lange-Hesse, Günther, **Analyse beobachteter Absorptionsschwankungen elektromagnetischer Wellen in der Ionosphäre.** [Analysis of observed variations of absorption of electromagnetic waves in the ionosphere.] *Naturwissenschaften,* 39(13):297–298, July **1952.** 5 refs. **DWB**—A calculation of the absorption factor for short waves (10–200 m or 30–1.5 MHz) shows that transmission is possible throughout the year near the equator, but in middle latitudes only in summer, when it can be forecast from sunspot number and 27-day cycle. In the auroral zone it is correlated with magnetic disturbances. *Subject Headings:* **1. Radio wave propagation 2. Sunspot cycles.**—*C.E.P.B.*

6D–125 551.510.535:551.521.32

Lauter, Ernst August and Sprenger, K., **Nächtliche Ionisationsstörungen der tiefen Ionosphäre.** [Nocturnal ionization disturbances of the lower ionosphere.] *Zeitschrift für Meteorologie,* 6(6):161–173, June **1952.** 19 figs., 20 refs. **MH-BH**—On the basis of almost 4 years of continuous record of nocturnal space radiation at 245 kHz registered with a frame antenna at approximately 55°N lat. (54° geomagnetic lat.) four types of ionization disturbances in the E layer are described. These

are the P-type (very rapid polarization variations without noticeable decline of reflection coefficient), S-type (storm type), A-type (absorption, nocturnal E reflections begin after sunset) and B-type (Bay disturbances). The relationships between these disturbances and terrestrial magnetic disturbances are analyzed statistically but cannot be explained by the accepted model of the ionospheric and terrestrial magnetic corpuscular disturbances. The possibility of ionospheric observations in the long wave region providing an explanation of the disturbances in the E layer and also an explanation of the relationship between atmospheric winds and these disturbances is suggested. *Subject Headings:* **1. Nocturnal radiation 2. Ionospheric disturbances 3. Ionization 4. E layer.**—*I.L.D.*

6D–126 551.510.535:621.396

McKenzie, A. A., **Reliable VHF signals up to 1,250 miles distance.** *Electronics*, N. Y., 25(6): 102–103, June **1952.** 2 figs., 4 refs. **DLC**—Signals which can regularly be heard at great distances, with an optimum at noon and poorest reception between 20 and 22 h (E.S.T.), are attributed to a phenomenon similar to the sporadic E layer (E_s) but *not* sporadic. The signal is *enhanced* during magnetic storms and SID's when other high frequency signals fade out. It must come from the part of the E layer below the level of maximum ionization or even below the absorbing region of the D layer. (See *Physical Review*, p. 141, April 1952.) *Subject Headings:* **1. Radio wave propagation 2. E layer reflection.**—*M.R.*

6D–127 551.510.5(02):016

†Mitra, Sisir K., **The upper atmosphere.** 2nd ed. Calcutta, The Asiatic Society, [Preface **1952.**] 713 p. figs., tables, bibliog. p. 644–668, eqs. **DLC, MH-BH**—The purpose of the book, as stated in the first edition (*see item* 1 57, Jan. 1950, *MAB*) is to give, "in a connected form, an account of the present state of our knowledge of the upper atmosphere as has been obtained so far by direct and indirect observations." The volume contains 13 chapters and an appendix and the bibliography of 887 items is arranged in that order. Author, source and imprint are given but no titles. Ch. VI, **The ionosphere** (p. 176–353) is a comprehensive survey covering history, propagation of electromagnetic waves, radio sounding of the ionosphere, absorption, application of ionospheric data to radio transmission, origin and stratification, variations, irregularities and disturbances and, finally, weather and the ionosphere. There are 294 references for Ch. VI (p. 649–656). Imprints cover the period 1902–1951. (*Same item as* 4.8–15, Aug. 1953 and 6B-128, Feb. 1955, *MAB.*) *Subject Headings:* **1. Upper atmosphere physics bibliographies 2. Textbooks.**—*M.L.R.*

6D–128 551.510.535:551.594.12

†Nicolet, Marcel (*Royal Met. Inst. of Belgium, Uccle, Belgium*), **The collision frequency of electrons in the ionosphere.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 32, Feb. 28, **1952.** 36 p. fig., table, 33 refs., eqs. Also in: *Journal of Atmospheric and Terrestrial Physics*, 3(4):200–211, May **1953.** 4 figs., 2 tables, 35 refs., 21 eqs. **DWB**—Theoretical analysis shows that the electron collision frequency in the ionosphere depends on the neutral particle concentration in the D and E regions and on the electron concentration in the F region. Any atmospheric model, above the E region, cannot, therefore, be based on the electron collision frequency. Observational values of the collision frequency reported for the D and E layers are generally too large due to the fact that equivalent heights, and not true heights, are used. Collecting the observational data and setting them at actual heights, a general consistency is found. For this reason, the current empirical formulas giving the vertical distribution of the collision frequency with height must be modified. *Subject Headings:* **1. Electron collision frequencies 2. Ionospheric physics.**—*Author's abstract.*

6D–129 551.510.535:551.594.12

Nicolet, Marcel, **Effects of the atmospheric scale height gradient on the variation of ionization and short wave absorption.** *U. S. Air Force. Cambridge Research Center, Geophysical Papers*, No. 11:263–272, **1952.** 2 tables, 6 refs., 35 eqs. **DWB**—Author demonstrates that material progress can be made in the explanation of the ionosphere by extending CHAPMAN's theory to allow for: 1) increase of the scale height from the D layer and upwards, 2) that the recombination coefficient varies with height and 3) that the ionizable constituents may have a different scale height from that of the main constituent. *Subject Headings:* **1. Ionization 2. Recombination coefficients 3. Ionospheric research.**—*W.N.*

6D–130 550.385:551.594.7:523.74

Osborne, C. B., **Magnetic and radio disturbance. North Atlantic Ocean.** *Marine Observer*, 22(156):66–68, **1952. DWB**—June 17, 1951, magnetic compass varied several degrees from gyro compass, during passage of a large sunspot. No radio signals could be received. Reports on disturbances from Admiralty Compass Observatory, Overseas Telecommunications Dept. of G.P.O.

and Central Forecasting Office, Dunstable, are included. *Subject Headings:* **1. Magnetic disturbances 2. Radio fading 3. Sunspots.**—*C.E.P.B.*

6D–131 551.510.535:621.396.812:523.746

Ostrow, S. M. and PoKempner, M. (*Central Radio Prop. Lab., Nat. Bureau of Standards, Wash., D. C.*), **The differences in the relationship between ionospheric critical frequencies and sunspot number for different sunspot cycles.** *Journal of Geophysical Research*, 57(4):473–480, Dec. **1952.** 9 figs., refs. **MH-BH**—Analysis of data for Washington and Watheroo indicates differences in the relationship between foF2 and sunspot number for the current and preceding sunspot cycles. The sunspot number is therefore not entirely satisfactory as an index for ionospheric variations. Consequently, ionospheric data for the current cycle only should be used in preparing ionospheric radio propagation predictions whenever possible. *Subject Headings:* **1. Ionospheric forecasts 2. Radio transmission 3. Sunspot cycles.**—*Authors' abstract.*

6D–132 551.510.535

Ranzi, Ivo (*Univ. of Florence*), **Una notevole anomalia della regione F2 nell'Antartide.** [An unusual anomaly of the F2 region of the Antarctic.] *Geofisica Pura e Applicata*, 23:65–68, **1952.** 5 figs., ref. English summary p. 65. **MH-BH**—The author reports the results of ionospheric observations made at Reception (Antarctica, 63.0°S; 60.7°W); during summer, the foF2 has a minimum about noon and a maximum at nearly 2300 (60° WMT). It was seen that in summer the foF2 shows at midnight a gradual and considerable increase with the southern latitude, about the 60° meridian. *Subject Headings:* **1. Ionospheric anomalies 2. F2 layer 3. Antarctica.**—*Author's abstract.*

6D–133 551.510.535 551.594.2

Ranzi, Ivo, **Sul carattere delle tempeste ionosferiche osservate a Buenos Aires.** [On the character of the ionospheric storm observed at Buenos Aires.] *Geofisica Pura e Applicata*, 23:60–64, **1952.** 7 figs., 4 refs. English summary p. 60. **MH-BH**—Study based on ionospheric and geomagnetic observations made in 1950 and 1951 in Buenos Aires and Washington, D. C. Author found a large positive phase of the storms in the F2 region in winter and close negative correlation between the F2 layer and the horizontal component of the terrestrial magnetic field. *Subject Headings:* **1. Ionospheric storms 2. F2 layer 3. Buenos Aires, Argentina 4. Washington, D. C.**—*A.A.*

6D–134 551.510.535:538.566.3:621.396.11

†Rawer, K., **Calculation of sky-wave field strength.** *Wireless Engineer*, London, 29(350):287–301, Nov. **1952.** 17 figs., 30 refs., 25 eqs. **DLC**—A method for the calculation of the field of the sky-wave, based upon the contributions of the different transmission paths, has been applied since 1940. It takes account of the effects of the lower ionospheric layers, such as absorption and cut-off, and of the geometrical optics of the reflecting layer. The trend of actual development in this field seems to be that former integral formulas are replaced by such differential methods. *Subject Headings:* **1. Sky wave field strength 2. Ionosphere.**—*Author's abstract.*

6D–135 551.510.535

*Schrag, R. L. (*Penna. St. Coll. Radio Propag. Lab.*), **An investigation of the 150 KC/S propagation characteristics of the upper ionosphere.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Ionospheric Research, Scientific Report, No. 33, March 15, **1952.** 41 p. graphs, 10 refs., 48 eqs. **DWB**—Extended studies of the 150 KC/S propagation characteristics into and through the F region indicate that the small amount of the ordinary wave component passing through the E layer, where the total reflection takes place below the maximum of electron density of this layer, will be totally absorbed in the F region. The extraordinary component however, suffers but moderate absorption and no reflection in the E layer, hence its possible use for radio sounding of the upper ionosphere or Störmer ring is the premise of the detailed investigation. The discussion emphasizes the following topics: 1) a complete wave solution carried through a found "pole" at 939 km with the aid of 2) a new method for solving the uncoupled wave equation, heretofore not obtained. *Subject Headings:* **1. Ionospheric reflection 2. F layer 3. Radio wave propagation 4. Störmer ring.**—*W.N.*

6D–136 551.510.535:551.594.7(98

Scott, James C. W. (*Radio Phy. Lab., Def. Res. Bd., Ottawa*), **The solar control of the E and F layers at high latitudes.** *Journal of Geophysical Research*, 57(3):369–386, Sept. **1952.** 19 figs. 3 refs. **DWB**—The monthly mean critical frequencies of the E and F1 layers at high latitudes are shown to vary diurnally with solar angle according to a modified Chapman law. The seasonal latitude, and solar-cycle dependence of the E layer sensitivity to solar angle and the sub-solar frequency are measured. In the auroral zone, the sensibility of the E layer to solar angle is shown

to be very low, but to the north of the zone it is found to have the theoretical Chapman value. *Subject Headings:* **1. Ionospheric layers 2. Radio wave propagation 3. Arctic.**—*Author's abstract.*

6D–137 551.510.535:551.594.13:550.38

Singer, S. Fred; Maple, E. and Bowen, W. A., Jr., **Dynamo currents and conductivities in the earth's upper atmosphere.** *Nature*, London, 170(4339):1093–1094, Dec. 27, **1952.** fig., 15 refs. **DLC**—Rocket measurements near the magnetic equator led to the discovery in the ionospheric E layer of a magnetic discontinuity produced by the Balfour Stewart (dynamo) current which is responsible for the diurnal (Sq) variation of the sea level magnetic field. The altitude interval in which this electric current flows is found to be very restricted; the deduced specific conductivity is 1000 times the value calculated when taking into account the reduction due to the horizontal magnetic field. To remove this discrepancy it is suggested that a polarization field produced by a transient Hall current offsets the effect of the magnetic field; the resultant increase in the conductivity is sufficient to agree with the value deduced from the rocket measurement. The observed current is then identified with that predicted by HIRONO as well as with the "electrojet" current empirically proposed by CHAPMAN to account for the exceptionally high value of Sq at Huancayo. The electrojet may thus be explained purely on the basis of the dynamo theory. *Subject Headings:* **1. E layer 2. Ionization 3. Terrestrial magnetism.**—*Authors' abstract.*

6D–138 551.510.535:551.594.12:550.38

Singer, S. Fred (*U. S. Office of Naval Res., London*), **Recent work on the conductivity of the ionosphere.** *U. S. Office of Naval Research, London, Technical Report, ONRL-30-52*, April 14, **1952.** 11 p. 2 figs., graph, 8 refs. **DWB**—After briefly discussing the dynamo theory to explain the solar diurnal variation of the earth's magnetic field, an analytical review of the theory follows, comprising the negative ion concentration in the lower atmosphere, which is inadequate to provide a dynamo current of significant magnitude in the D layer. Finally, the same experimental measurement pertinent to the problem of dynamo currents and conductivities in the upper atmosphere is reported. Sounding rockets were used in these experiments. Results are discussed which solve some problems but open new ones. *Subject Headings:* **1. D layer 2. Ionization 3. Terrestrial magnetism.**—*W.N.*

6D–139 551.510.535:551.594.7

Singh, Tej Pratap, **Fading of radio signal on medium wave from oscillatory motion of lower ionosphere.** *Science and Culture*, Calcutta, 17(11):472–473, May **1952.** 2 figs., 15 refs. **MH-BH**—Brief note on a fading phenomenon observed on 338.6 m and 434.8 m at Dehli. The theory of oscillatory motion of the lower ionosphere is introduced to explain the phenomenon. *Subject Headings:* **1. Radio fading 2. Ionospheric oscillations 3. Delhi, India.**—*W.N.*

6D–140 551.510.535:551.508.96

Stanford Univ. Radio Propagation Laboratory, **Study of sporadic ionization of the upper atmosphere by means of back-scattered radio signals.** Contract DA-04-200-ORD-181, Status Report, No. 1, July 1–Oct. 1, **1952.** 7 p. Photostat of typescript. **DWB**—Report on the initial phase of a project aimed at the collection of data on the nature and characteristics of "clouds or patches of ionization" appearing sporadically in the E layer, and on concurrent weather phenomena. A continuously operating scatter-sounding apparatus (completed and installed as the first task undertaken toward the project) is described and its operation explained. *Subject Headings:* **1. Sporadic E layer 2. Ionospheric scattering.**—*G.T.*

6D–141 551.510.535:551.594.7

Strohfeldt, M.; McNicol, R. W. E. and Gipps, G. de V., **Ionospheric measurements, at oblique incidence over eastern Australia.** *Australian Journal of Scientific Research, Physical Sciences, Ser. A*, 5(3):464–472, Sept. **1952.** 3 figs., 3 plates, 10 refs. **DWB**—An account is given of night observations of oblique-incidence pulse transmissions on 5.8 Mc/s. over a baseline of 763 km, using a responder technique. The experiments aimed at measuring apparent path lengths as a guide to the identification of the reflection to the echo system received after ionospheric reflection. A correlation of E_s occurrences as observed at oblique incidence and vertical incidence near the midpoint of the trajectory was effected, and certain characteristics of the E_s layer are presented. Unusual records of Pedersen rays are reproduced and sudden height increases and diffuseness of F2 echoes are discussed. A check on the oblique-incidence theory using a Millington transmission curve on vertical-incidence *h'f* records yielded reasonable agreement between measured and deduced reflection heights, although there is evidence of a tendency for the predicted obliquity factor to be too low. A rough analysis of oblique-incidence penetrations yielded an average value for the frequency separation of the magnetoionic M.U.F.'s close to half the gyromagnetic frequency. *Subject Headings:* **1. Ionospheric reflection 2. Pedersen rays 3. Australia.**—*Authors' abstract.*

6D–142 551.510.535:551.508.96

Utah. University, **Physical properties of the upper atmosphere.** Contract W19-122-ac-15, Progress Report, No. 11–16, Dec. 31, 1950–March 31, 1952. 6 pieces. figs., refs. **DWB**—Detailed report on the development, design, construction and testing of transmitter and antenna to be installed in a Blossom IV (V-2) and an Aerobee rocket and of the recording receiver to be used on the ground. Numerous diagrams are included. The purpose was to determine the ion densities in the ionosphere and their variations in time and space. This was to be done by pulse transmissions through the ionosphere, mainly at frequencies near the critical frequency of the E layer. It was also desired to determine the effect of the ionosphere on pulse transmissions. Unfortunately, at the moment of explosion during the firing of the rocket, no data were obtained. *Subject Headings:* **1. Upper atmosphere research 2. Rocket research 3. Ionosphere. I. Linford, Leon B.**—*A.A.*

6D–143 551.510.535

Uyeda, Hiroyuki; Miya, Kenichi and Kobayashi, Tsuneto (*Radio Wave Res. Lab.*), **On the cause for unnatural distribution of occurrence of fE_s and $fmin^F$.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 6(4):179–183, Dec. **1952.** 4 figs., ref., 3 eqs. **DWB**—*Subject Heading:* **1. Ionospheric variations.**

6D–144 551.510.535

Uyeda, Hiroyuki (*Ionosph. Res. Committee, Japan*), **Studies on ionospheric storms.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 6(4):169–177, Dec. **1952.** 7 figs., 9 refs. Also issued as *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 173–186. **DWB**—Progress in the investigation of ionospheric storms achieved during the past two years by the Ionosphere Research Committee, Science Council, Japan, is briefly reviewed. The papers discussed are on 1) classification, 2) characteristics and 3) development and distribution of ionospheric storms. The need for more extensive ionospheric data, especially in high latitudes, is stressed. *Subject Headings:* **1. Ionospheric storms 2. Ionospheric research.**—*G.T.*

6D–145 551.510.535

Villard, Oswald G., Jr. and Peterson, Allen M. (*Radio Prop. Lab., Stanford Univ.*), **Scatter-sounding: a new technique in ionospheric research.** *Science*, 116(3009):221–224, Aug. 29, **1952.** 3 figs., 6 refs. **DLC**—Suggests that ionospheric investigations may be considerably extended in range from one station by the use of echoes back-scattered from the ground after reflection at oblique incidence at the E or F regions. It is found that pulse lengths about 10 times those commonly used for vertical-incidence sounding received on conventional communication equipment provide satisfactory ground back-scattered echoes for ionospheric reflecting points as far away as 1250 mls (F layer) or 600 mls (E layer). Possible applications are considered. *Subject Headings:* **1. Scatter sounding 2. Ionospheric research.**—*Physics Abstracts, No. 561, 1953.*

6D–146 551.510.535:621.396.11

†*Weekes, K. and Stuart, R. D., **The ionospheric propagation of radio waves with frequencies near 100 kc/s over distances up to 1000 km.** *Institution of Electrical Engineers, Proceedings*, Pt. 4, 99(2):38–46, April, **1952.** 13 figs., 4 tables, 11 refs. **DLC**—The first paper (*see item* 6D–147) described steep incidence and this paper is an extension of the observations and discusses oblique incidence. The results show: (1) Height of reflection for distances greater than 400 km is about 70 km at midday in summer and no definite variation of height with frequency was observed. (2) The reflection coefficient increased steadily with distance (0.02 at 300 km to 0.09 at 800 km); lesser at higher frequencies. The winter reflection coefficient roughly doubled the summer values. Except for that, during sudden disturbances, the amplitude of the sky wave increases by a factor up to 5, and sometimes reaches the night values (distance 850–900 km from the sender). The observations to a great extent correlate well with those discussed in the first paper. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*W.N.*

6D–147 551.510.535:621.396.11

†*Weekes, K. and Stuart, R. D., **The ionospheric propagation of radio waves with frequencies near 100 kc/s over short distances.** *Institution of Electrical Engineers, Proceedings*, Pt. 4, 99(2):29–37, April **1952.** 5 figs., 18 refs. **DLC**—The transition between reflection of radio waves at v.l.f. (16 kc/s) and at higher frequency (2 Mc/s) was studied in Cambridge during 1933–1936. For the former frequency there is a large downcoming wave (from an estimated height of about 70 km) even during a summer day. For the latter the downcoming wave (from an apparent height of about 100 km) is weak, sudden disturbances of the type associated with bright solar eruption are characterized by a marked increase in absorption. The observations were made about 100 km from the c.w. senders that were used and revealed same main characteristics of the downcoming wave

at frequencies between 70 and 128 kc/s, viz.: 1) marked solar control of absorption and the reflecting height, 2) absorption change begins one hour before sunrise, 3) the average decrease of the reflecting height is 7–8 km, but on any one day only 3–4 km which is in marked contrast with the observations at 16 kc/s whose decrease is about 19 km in summer and 14 km in winter, 3) at night the waves fade in random manner (quasi-period of 5 min. at frequencies at 70.83 and 113.3 kc/s while 1 min at frequency 127.5 kc/s). *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.** —*W.N.*

6D–148 551.510.535:538.5666

Wiesner, J. B. (*M.I.T., Cambridge, Mass.*), **A new kind of radio propagation at very high frequencies observable over long distances.** *Physical Review*, 2nd Ser., 86(2):141–145, April 15, **1952.** 5 figs., 8 eqs. **DLC**—Treats the discovery and some experimental results of the weak vhf ionospheric propagation type observable over ranges up to 2000 km distance, but likely masked by other kinds of propagation at distances less than 1000 km from the transmitter. Using 49.8 Mc/s over a 1245 km path, the particular signal was observed regardless of season, time of day and geomagnetic disturbances. Based on strong indications that the signal is returned from the E region below the maximum ionization level, perhaps even below the absorption region (D region), a speculative explanation in terms of parameter is presented. *Subject Heading:* **1. Radio wave propagation.** —*W.N.*

1953

6D–149 551.510.535:621.396(02)

*†Al'pert, IA. L.; Ginzburg, V. L. and Feĭnberg, E. L., **Rasprostranenie radiovoln.** [Radiowave propagation.] Moscow, Gos. Izdat. Tekhniko-Teoreticheskoĭ Literatury, **1953.** 883 p. 128 figs., 124 tables, 373 refs. Price: 33 Rub. 55 Kop. **DLC**—The most advanced text on theoretical and empirical aspects of radio wave propagation in all bands from microwaves to long waves, and in the troposphere and ionosphere. First there is a historical sketch of progress in radio science since Popov (1845), especially in Russia. Then in Pt. I, the general theory of radio propagation; Pt. II, theory of propagation in ionosphere (p. 278–546); Pt. III, structure of ionosphere and experimental data on formation; regular and irregular processes in ionosphere (p. 547–680); Pt. IV, experimental investigations on propagation and comparison with calculated data by various methods (p. 681–870). The first part of this voluminous text is mainly theory; the last part is practical—data, tables, recorder records and interpretations, nomograms, etc. All of the layers of the ionosphere are treated, as well as the troposphere in relation to long distance propagation. Radar and impulse propagation are also considered. The extensive bibliography in 5 parts consists of about half Russian and half foreign literature through 1952. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric propagation 3. Tropospheric propagation 4. Bibliography on ionosphere 5. Textbooks.**—*M.R.*

6D–150 551.510.535

Aono, Yuchiro (*Radio Research Laboratories, Tokyo*), **Regional anomalies in *foF*² of the ionosphere.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 1(1):30–33, **1953.** 3 figs. Also in: *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 167–173. fig., 2 refs. **DWB**—Charts of the regional anomalies in foF2 of ionosphere for Jan., March and May, for the entire world are presented and are based on ionospheric data from all over the world for four years (1946–50 excluding 1949). Monthly charts were drawn and the 3 presented to show winter and summer conditions. Anomalies are represented as to ratio of average monthly value to highest monthly median value, expressed in percentages, with lines drawn for each 10%. Anomalies are analyzed and discussed. *Subject Headings:* **1. foF2 anomaly charts 2. World ionospheric anomaly charts.**—*M.R.*

6D–151 551.510.535:621.396.812

Appleton, Sir Edward, **Storm phenomena in the atmosphere.** *Archiv der Elektrischen Übertragung*, 273/7(6):271–273, June **1953.** 4 figs., 4 refs. German and English summaries p. 271. **DLC**—Recent advances in knowledge of F2 layer ionospheric perturbations accompanying magnetic storms are summarized. It is shown that these perturbations are subject to a marked diurnal control. Differences between phenomena at high, medium and low latitudes are identified, while an attempt is made to relate ionospheric storm phenomena in medium latitudes to the geomagnetic distortion of the F2 layer previously identified by the writer. For this range of latitudes it is shown that the effect of a storm is to enhance the magnitude of the geomagnetic distortion already present. *Subject Headings:* **1. Ionospheric storms 2. Magnetic storms.**—*Author's abstract.*

6D–152 551.510.535:538.566.3

Argence, Émile; Rawer, Karl and Suchy, Kurt, **Influence du champ magnétique terrestre sur l'absorption des ondes courtes dans l'ionosphère (incidence normale).** [Influence of the terrestrial

magnetic field on the absorption of short waves in the ionosphere (normal incidence).] *Académie des Sciences, Paris, Comptes Rendus*, 236(2):190–192, Jan. 12, **1953.** fig., 3 refs., 3 eqs. **DLC**—Using a formula previously developed by ARGENCE and assuming that the collisional frequency follows an exponential law, calculations of the coefficient of absorption k are made for a parabolic E layer with critical frequency 3.5 Mc/s. The results are in good accord with those obtained by the more rigorous Appleton-Hartree formula, but are markedly different from those given by the Sellmeyer formula which neglects the earth's magnetic field. However, the effective absorption of a ray reflected by the layer, $\int k.dz$, is little different as the overall magnetic field corrections roughly compensate. *Subject Headings:* **1. Ionospheric absorption 2. Radio wave propagation 3. Terrestrial magnetism.**—*Physics Abstracts, No. 3461, 1953.*

6D–153 551.594.7:551.510.535

Argence, Émil and Mayot, M., **Méthode de détermination des hauteurs vraies des couches de l'ionosphère, II, Utilisation de la valeur exacte de l'indice de réfraction (cas du rayon ordinaire).** [Method of determining the true heights of ionospheric layers, Pt. 2. Use of the exact value of the index of refraction (case of ordinary rays).] *Journal of Geophysical Research*, 58(4):493–496, Dec. **1953.** table, 2 refs. **DLC**—Determination of the characteristic parameters of an ionized layer by the hypothesis where the variation of the electronic density ensues from a parabolic law, to the first approximation, is described. Also shown is the application of the exact value of the refractive index (APPLETON-HARTREE). (For Pt. I *see item* 5.8-93, Aug. 1954, *MAB.*) *Subject Heading:* **1. Ionospheric reflection.**—*Authors' abstract.*

6D–154 551.510.535:621.396.11

Becker, Walter, **Typische Streuprozesse radiofrequenter Strahlung an Elektronenwolken der sporadischen Es-Schicht dargestellt an Hand ausgewählter Durchdrehaufnahmen.** [Typical processes of scattering of radio waves by electron clouds in the sporadic E layer, as shown by selected revolving-camera photographs.] *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, p. 186–193, pub. **1953.** 6 figs., 12 refs. **DWB**—The correctness of T. L. ECKERSLEY's disclosure of the influence of electron clouds of the sporadic E layer on the propagation of electromagnetic waves which can be of different horizontal extension is confirmed by a number of selected multifrequency photographs representing Eckerley's typical scattering phenomena in E clouds made at the Institute for Ionosphere Studies at Linden. *Subject Headings:* **1. Electromagnetic wave propagation 2. Sporadic E layer 3. Scattering of radio waves.**—*A.M.P.*

6D–155 551.510.535:621.396:11

Becker, Walter, **Typische Streuprozesse radiofrequenter Strahlung an Elektronenwolken der sporadischen E_s-Schicht dargestellt an Hand ausgewählter Echolotungsaufnahmen mit veränderlicher Frequenz.** [Typical processes of scattering of radio waves from sporadic E clouds illustrated with selected echo sounding records of varying frequency.] *Archiv der Elektrischen Übertragung*, 7(8):375–378, Aug. **1953.** 6 figs., 12 refs. **DLC**—Various possible modes of scattering from sporadic E clouds are considered and typical (P', F) records are reproduced to illustrate these modes. *Subject Headings:* **1. Scattering of radio waves 2. Sporadic E layer.**—*Electrical Engr. Abstracts, No. 1255, 1954.*

6D–156 551.510.535:551.594.7:523.746

Bennington, T. W., **Critical frequency variations.** *Wireless Engineer*, London, 30(7):175–179, July **1953.** 8 figs., 3 tables, 2 refs. **DLC**—Twelve-month running averages of critical frequencies for the F2 layer are plotted against twelve-month running averages of sunspot numbers for two stations in the Northern Hemisphere and two in the Southern Hemisphere, as well as for one station near the equator. It is found that, whereas in the Northern Hemisphere there is a pronounced tendency for the rate of increase of critical frequency to become smaller for the higher values of sunspot number, this tendency is not evident in the Southern Hemisphere. Near the equator the critical frequency behaviour lies between that for the Northern and Southern Hemispheres respectively. A suggestion is made that a 'saturation' effect may occur for high values of sunspot number in the Northern Hemisphere at the time of the annual minimum, which occurs in local summer, but not in the Southern Hemisphere where there are two annual minima, one of which occurs in local winter. *Subject Headings:* **1. F2 layer 2. Ionospheric reflection 3. Sunspot effects.**—*Author's abstract.*

6D–157 551.510.535

Bibl, Klaus, **Die Ionosphärenschichten und ihre dynamischen Phänomene.** [The ionospheric layers and their dynamic phenomena.] *Zeitschrift für Geophysik, Sonderband*, Brunswick, p. 136–

141, 1953. 2 figs., 11 refs. **DWB**—Suggests the study of synoptic processes in the ionosphere by means of ionograms, each taken within 12 sec by the author's equipment (*see item* 4.4–62, April 1953, *MAB*), which is attached to a moving picture camera (speed up to 1:300). Definitions of E, F and G regions are discussed. *Subject Headings:* **1. Ionospheric layers 2. Ionograms.**—*A.A.*

6D–158 551.510.535:551.594.7

Bouchard, Jean, **Sur la propagation ionosphérique des ondes décametriques dans les régions polaires arctiques.** [On ionospheric propagation of 10 m waves in the Arctic.] *Académie des Sciences, Paris, Comptes Rendus*, 236(2):220–222, Jan. 12, **1953. DLC**—Systematic study of the propagation of 10m waves over great distance shows the influence of ionic disturbances in the Arctic, connected with magnetic disturbances. The signals received at Dijon, France, from the region of the North Pacific (NE Siberia, Alaska, British Columbia, the Pacific Northwest and Hawaii) are distorted when passing through the belt of maximum auroral activity during magnetic storms but signals from other parts of the Pacific (Japan, Mariannes, New Zealand, etc.) are not thus distorted, except when taking secondary paths traversing these disturbed zones. *Subject Headings:* **1. Radio propagation over long distance 2. Ionospheric disturbances 3. Arctic.**—*M.R.*

6D–159 551.510.535:523.74

Bureau, Robert (*Nat. Lab. of Radioelectricity, Bagneux, near Paris*), **Réseau d'enrégistreurs de P.I.D.B. (renforcements brusques) sur 11.000 mètres.** [Network of recorders of ionospheric perturbations with sudden commencements on 11,000 m.] *International Council of Scientific Unions, Brussels, 8th Report of the Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952*, p. 10–11, pub. **1953.** 2 figs. **DWB**—Running annual sums of monthly numbers of sudden ionospheric perturbations, 1929 through 1951, show a very close parallelism with sunspot relative numbers. P.I.D.B. only give intensifications between wave lengths of about 6000 and 17,000 m. This is illustrated by records on 2–24 km at Bagneux and Poitiers, on June 17–18, 1941. *Subject Headings:* **1. Ionospheric storms 2. Sunspot effects.**—*C.E.P.B.*

6D–160 551.510.535:550.38

Burkhart, K., **Positive und negative magnetische Baistörungen.** [Positive and negative magnetic bay disturbances.] *Geofisica Pura e Applicata*, 24:54–56, Jan./April **1953.** fig., 7 refs. **MH-BH**—Magnetic bays are divided into two classes: (a) those with positive and (b) those with negative *H*-variations. The former class occurs mainly before midnight and the latter after midnight. Five selected magnetograms from Fürstenfeldbruck Magnetic Observatory, Bavaria, are reproduced to show common and rare forms of + and − bay disturbances and analysis showing vectors of ionospheric ribbon currents which would accompany such disturbances. The H current alone cannot give any indication of the nature of these currents, but it must be considered together with the D-fluctuations. In the auroral zone the D-maximum often appears before the H-maximum in connection with a meridional current changing to a zonal current. *Subject Headings:* **1. Magnetic bay disturbances 2. Ionospheric ribbon currents 3. Fürstenfeldbruck Magnetic Observatory, Bavaria.**—*M.R.*

6D–161 551.510.535

Commission Mixte de l'Ionosphère. Troisième réunion. Canberra (du 24 au 26 août 1952). [Mixed Commission on the Ionosphere. Third meeting. Canberra (August 24–26, 1952).] *International Union of Geodesy and Geophysics, Bulletin d'Information*, 2(2):377–380, April **1953. DWB**—Discussion on ionospheric storms, changes during solar eclipses, conductivity of ionosphere, radio auroral echoes, and International Geophysical Year 1957–58. A comprehensive program is outlined for the latter. *Subject Headings:* **1. Ionosphere 2. International Geophysical Year 1957–1958 3. I.U.G.G. Mixed Commission on the Ionosphere.**—*M.R.*

6D–162 551.510.535:550.38

*Cutolo, M., **Determinazione sperimentale dell'intensità totale del campo magnetico terrestre nella regione inferiore dell'alta atmosfera (strato E).** [Experimental determination of the total geomagnetic field intensity in the lower region of the upper atmosphere (E layer).] *Il Nuovo Cimento*, 10(7):915–925, July 1, **1953.** 3 figs., 3 tables, 11 refs., 11 eqs. English summary p. 923. **DLC**—Two methods of measurement of the geomagnetic field in the E layer, the girointeraction method and the autogirodemodulation method, are described. Values of geomagnetic field intensity obtained by both methods (Florence-Turin and Florence-Naples, 1949–1951) are tabulated. It appears that geomagnetic field intensity aloft is weaker than at the earth's surface. The author believes that this decrease and the observed fluctuations of the magnetic field indicate the existence of electric currents in the E layer. *Subject Headings:* **1. Geomagnetic activity 2. Terrestrial magnetism 3. E layer 4. Italy.**—*G.T.*

6D–163 551.510.535:550.38

Cutolo, M., **Measurements of the terrestrial magnetic field in the E-layer.** *Nature*, London, 172(4382):774–775, Oct. 24, 1953. fig., table, 2 refs. **DWB**—Describes briefly a method of determining total intensity of earth's magnetic field by self-demodulation of radio waves. Values found in Italy in 1949–1951 are around 0.43 oersted. *Subject Headings:* **1. E layer 2. Magnetic fields.**—*C.E.P.B.*

6D–164 551.510.535:551.594.7

Davids, Norman and Parkinson, R. W., **A long-wave solution near critical coupling.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 54, Nov. 25, 1953. 8 figs., tables, 17 refs., eqs. **DWB**—By using the reference system based on the principal directions of the three-dimensional dielectric ellipsoid, it is possible to put the coupled wave-propagation equations into a form where the coefficients are well-behaved. This is particularly desirable for ionospheric models containing regions near critical coupling. It is shown how the more usual equations can be transformed. "First order" results are obtained for data at 150 kc/s, including scattering coefficients. It is also shown that reflections exist at critical coupling, but that their magnitudes are less than 10%. Methods of solution for the exact equations are described. *Subject Headings:* **1. Ionospheric models 2. Ionospheric propagation 3. Ionospheric reflection.**—*Authors' abstract.*

6D–165 551.510.535:551.593.7:538.61

Davids, Norman (*Ionos. Res. Lab., Penna St. Coll., State College, Pa.*), **Optic axes and critical coupling in the ionosphere.** *Journal of Geophysical Research*, Washington, D. C., 58(3):311–321, Sept. 1953. 3 figs., 9 refs., eqs. Also in: Pennsylvania. State College. Ionosphere Research Laboratory, Scientific Report, No. 43, Jan. 30, 1953. 20 p. 3 figs., 8 refs., eqs. **DWB**—Critical coupling arises when, for a certain critical $N = N_c$ and $v = v_c$ the coupling factor, which measures the degree of interaction between the ordinary and extraordinary modes, becomes infinite. Instead of attempting to solve the standard coupled wave equations at or near this singularity, a different reference system is introduced based on the principal directions of the three-dimensional dielectric ellipsoid. These directions depend only on the direction of the earth's field, and are thus essentially constant over the ionosphere. Analogy with crystals, as pointed out by LANGE-HESSE, suggests the possibility of optic axes in the ionosphere. It is shown here that such axes can exist in the presence of collisions and that this is precisely the condition for critical coupling. The ionosphere acts isotropically at such a level, with no principal modes being singled out. Some application to data at 150 kc/sec is made. *Subject Heading:* **1. Ionospheric polarization.**—*Author's abstract.*

6D–166 551.510.535

Ellis, G. R., **Angle of arrival of Z echoes.** *Nature*, London, 171(4345):258–259, Feb. 7, 1953. fig., ref. **DLC**—Measurements made at Hobart (mag. lat. 51°S) during July–August 1952 on 4.65 Mc/s to test SCOTT's hypothesis that the weak third F2 penetration frequency (Z mode) observed at high magnetic latitudes is due to longitudinally propagated waves reflected from an area near the magnetic zenith. The Z echo reflection height was 170–210 km, and mean direction 7.8°N of the vertical in the magnetic plane. These results are inconsistent with the collisional frequency required on Scott's theory. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*Physics Abstracts, No. 3771, 1953.*

6D–167 551.510.535:523.78(672)

Estrabaud, Stéphane, **Effets de l'éclipse solaire du 25 février 1952 sur la région ionosphérique F2 en Afrique Équatoriale.** [Effects on the solar eclipse of Feb. 25, 1952 on the ionospheric F2 region in equatorial Africa.] *Académie des Sciences, Paris, Comptes Rendus*, 235(23):1521–1523 Dec. 10, 1952. ref. **DWB**—A detailed analysis of changes in the behaviour of the F2 layer from 0500 h to 0840 h due to the eclipse which commenced at Bangui, French Equatorial Africa (4°N 19°E), at 0703 h, reached totality at 0820–0823 h and ended at 0948 h. Two theories are presented to explain the unexpectedly slight changes in critical frequency of the F2 layer. *Subject Headings* **1. Ellipse effects 2. F2 layer changes 3. F2 layer critical frequencies 4. Bangui, French Equatorial Africa.**—*M.R.*

6D–168 523.70:551.510.535

Estrabaud, Stéphane, **Influence de l'éclipse solaire du 25 février 1952 sur la région ionosphérique E en Afrique Équatoriale.** [Influence of the solar eclipse of February 25, 1952 on the ionospheric region E in Equatorial Africa.] *Académie des Sciences, Paris, Comptes Rendus*, 236(8):833–835 Feb. 23, 1953. 2 figs., refs. **DWB**—Ionospheric soundings made at Bangui (4°22'N, 18°36'E) at 5-minute intervals during the solar eclipse are reported and their results shown in diagrams. The hypothesis of the existence of two solar regions more active than the rest (one situated in the

corona in the west and projected outside the solar disc; the other originating near the eastern rim and projected inside the disc) is tested qualitatively against the values obtained. *Subject Headings:* **1. Solar eclipses 2. Solar phenomena 3. E layer 4. French Equatorial Africa.**—*G.T.*

6D–169 551.510.535

Gerjuoy, E. (*Univ. of Pittsburgh*) and Biondi, M. A. (*Westinghouse Res. Labs., East Pittsburgh, Pa.*), **Dissociative recombination in the E-layer.** *Journal of Geophysical Research*, Wash., D. C., 58(3):295–303, Sept. **1953.** 14 refs., 25 eqs. **DWB**—The present paper discusses the consequences of the assumption that dissociative recombination determines electron removal in the E layer. The observation that the apparent recombination coefficient, a, does not depend markedly on the altitude of the E layer, electron density, or time of day imposes restrictions on the rates of the various atomic collision processes. It is shown that a must be very nearly equal to the actual dissociative recombination coefficient of O_2^+ ions and electrons. The conversion of O^+ to O_2^+ by charge transfer is consistent with ionospheric observations provided that the transfer cross-section is $\gtrsim 10^{-17}$ cm². In addition, the negative ion concentration is required to remain smaller than the electron concentration at all times. It is concluded that dissociative recombination is far more satisfactory than ion-ion recombination in explaining the E layer observations, and that most of the atomic processes proposed for this mechanism are subject to accurate laboratory measurement. *Subject Headings:* **1. E layer 2. Recombination processes.**—*Authors' abstract.*

6D–170 551.594.12

Gibbons, J. J. and Bedient, P. E., **Some exact solutions of the electrodynamical problem of superimposed positive and negative fluids.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 51, Oct. 10, **1953.** 40 p. numerous eqs. **DWB**—The problem of the electrodynamics of an ionized medium is approached by seeking some self-consistent solutions for problems with simple symmetries. The differential equations for such a study are given in Lorentz invariant form and several exact solutions to this system are presented. *Subject Headings:* **1. Ionized media 2. Ionization.**—*Authors' abstract.*

6D–171 551.510.535

Goroshankina, A. A., **K voprosu o lokalizatsii neodnorodnosteĭ v ionosfere.** [Localization of heterogeneity in the ionosphere.] *Akademiia Nauk SSSR, Doklady*, 93(3):459–461, Nov. 21, **1953.** figs., 6 refs. **DLC**—Inhomogeneities, which cause oscillations of signal amplitudes reflected from the F layer can be located, according to the author, by means of ionospheric soundings at different points at different frequencies simultaneously. Preliminary results of 14 observations carried out by the author are presented and discussed. *Subject Headings:* **1. Ionospheric oscillations 2. Ionospheric soundings.**—*A.M.P.*

6D–172 551.510.535:621.396.11

Great Britain. Dept. of Scientific and Industrial Research. Radio Research Board, **Characteristics of the ionosphere observed in Great Britain 1930–1946. Measurements made at the Radio Research Station, Slough, England, 1930–1946 and at Burghead, Scotland, 1941–1946.** Its *Special Report*, No. 23, **1953.** vi+16 p. 9 figs., tables, 21 refs. **DLC, GB-MO**—The introduction gives a history of the methods of ionosphere investigation—critical frequency, pulse method, etc. In Pt. 2 the observations at Slough and Brughead, Scotland, are described. Appendixes define units and symbols and list the hourly measurements. Microfilm or enlarged copies can be bought. (*Same item as* 5.3–129, March 1954, *MAB.*) *Subject Headings:* **1. Ionospheric research 2. Slough, England.**—*C.E.P.B.*

6D–173 551.510.535

*Hamburg. Meteorologisches Observatorium, **Ionosphären-Bericht.** [Ionospheric report.] First issue received, v. 5, no. 1, Jan. 1/10, **1953**— Latest issue seen, v. 6, no. 37, Dec. 27/31, **1954.** 4 p. per issue. graphs. Issued with collaboration of the Arbeitsgemeinschaft Ionosphäre, at Darmstadt. **DWB**—Routine features: current data and review of earth magnetic and ionospheric disturbances, relative sunspot numbers, schematic sunspot charts, limiting frequency of the F2 layer, geomagnetic amplitudes, solar eruptions, bursts, corona observations, maximum frequency of the sporadic E layer, geomagnetic characteristics, ultraradiation and radiation of longest waves. *Subject Headings:* **1. Ionospheric data 2. Solar data 3. Sunspots. I. Arbeitsgemeinschaft Ionosphäre, Darmstadt, Germany.**—*A.A.*

6D–174 551.510.535:621.396

Harnischmacher, Ewald, **Prévision de la propagation ionosphérique pour les distances supérieures à 10 000 km.** [Forecasting ionospheric propagation for distances over 10,000 km.] *Académie des Sciences, Paris, Comptes Rendus*, 237(18):1071–1073, Nov. 2, **1953.** 3 refs. **DWB**—A method

is outlined for determining mixed trajectories of long-distance ionospheric radio wave propagation. The method accounts for the fact that radio waves follow trajectories adapted to ionospheric conditions. The accuracy of a propagation forecast for a distance of 17,000 km was confirmed in experimental operation. *Subject Headings:* **1. Ionosphere 2. Radio wave propagation.**—*G.T.*

6D–175 621.396:551.510.535

Hanson, G. H.; Serson, H. V. and Campbell, W., **Maximum usable frequencies and lowest usable frequencies for the path Washington and Resolute Bay.** *Journal of Geophysical Research*, 58(4):487–491, Dec. **1953.** 3 figs., 3 refs. **DLC**—The standard frequency transmissions of WWV were monitored at Resolute Bay for one year. Using a method developed by Scott, maximum usable (MUF's) and lowest usable frequencies (LUF's) have been obtained for the path Washington to Resolute Bay for that period. Comparison with the predictions made by the Central Radio Propagation Laboratory in Washington indicates that the predicted MUF's are too low during the night and, for some months, too high during the day. The LUF's are lower than would be expected if the propagation were all by one reflection from the F2 layer. *Subject Headings:* **1. Radio transmission 2. F2 layer.**—*Authors' abstract.*

6D–176 551.510.535

Hasegawa, H. and Maeda, H., **Note on the electrical conductivity of the ionosphere.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere. Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 123–124. 9 figs., 8 refs. **DWB**—Results of an analysis of diurnal variations of geomagnetism by the method of approximate calculation showed that the daily range of variations of upper atmosphere electric conductivity is greater in N–S direction than it is in E–W direction. This is attributed to differences in variations and behaviors of ions and electrons in the upper layers. The calculated values together with data of ionospheric observations make it possible to determine more reasonable values concerning the electrical state of the ionosphere. *Subject Headings:* **1. Ionospheric conductivity 2. Geomagnetic variations.**—*A.M.P.*

6D–177 551.594.7:621.396.029.6

Helliwell, R. A. (*Stanford Univ., Stanford, Calif.*), **Graphical solution of sky-wave problems.** *Electronics*, 26(2):150, 152, Feb. **1953.** 2 figs. **DLC**—If any two of the following factors are known: 1) great circle distance between transmitter and receiver, 2) virtual height of reflection, 3) equivalent path distance between transmitter and receiver, 4) angle of departure and 5) angle of incidence at the ionosphere, the other three are easily found by the use of a sky wave transmission chart, the use of which is shown by examples. *Subject Headings:* **1. Ionospheric reflection 2. Microwave propagation.**—*W.N.*

6D–178 551.510.535:621.396.029

*Omori, T. and Okumura, Y. (*Electrical Communication Lab.*), **Results of vertical arrival angle measurement for radio waves from San Francisco.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 7(1):29, **1953.** **DWB**—Data for seasonal vertical angle measurement for radio waves from San Francisco for June 1951 to April 1952 are presented and analyzed according to the frequency of the waves received. The vertical arrival angle at O Observatory was found to be proportional to FoE/f and FoF2/f where FoE and FoF2 are measured at the receiving station and f is the working frequency of the waves received (13.78, 7.715, 18.(and 9.49 Mc/s, respectively). *Subject Headings:* **1. Ionospheric radio wave reflection 2. foF2 reflection 3. Oi Observatory, Japan.**—*M.R.*

6D–179 550.389:551.510.53

Hojo, Hisashi and Yonezawa, Toshiyuki, **On a change in geomagnetic declination accompanying intense sporadic E layer ionization.** *Japan. Science Council. Ionosphere Research Committee Report of Ionosphere Research in Japan*, 7(2):61–67, **1953.** 3 figs., 7 refs. **DWB.** Also his **Supplement** (to the above article), *Ibid.*, 7(4):159–161, **1953.** fig., eq. **MH-BH**—By an analysis of geomagnetic and ionospheric data observed at Kakioka and Kokubunji, respectively, it has been concluded that the geomagnetic declination shows a small deflection in the direction of amplifying its diurnal variation a few hours after the appearance of an intense Es layer. This suggests that th intense Es layer is more probably produced by ionization as a result of incidence of some sort o particles. *Subject Headings:* **1. Geomagnetic declinations 2. Sporadic E layer ionization 3. Kakioka, Japan 4. Kokubunji, Japan.**—*Author's abstract.*

6D–180 551.510.535(08

†International Council of Scientific Unions. Mixed Commission on the Ionosphere, Thir Meeting, Canberra, Australia, Aug. 24–26, 1952, **Proceedings.** Brussels, **1953.** 194 p. numerou figs., bibliogs. Headings in French and English; papers in French, English or German. Summarie

in English and French for some papers. **DWB**—Includes list of members of the Mixed Commission; names of those attending the meeting; eleven papers read at the six sessions on Aug. 24–26, 1952 and dealing with the ionosphere, magnetic storms, aurora and the International Geophysical Year, 1957–58; Commission resolutions and twelve papers submitted to the Commission. Abstracts of some of these papers appear in this bibliography. (*See* 6D–120, –150, –154, –175, –206.) *Subject Headings:* **1. Ionospheric symposia 2. Ionospheric physics conferences.**—*M.L.R.*

6D–181 551.510.535:551.543

International Scientific Radio Union, Brussels, **Tidal phenomena in the ionosphere.** Published with the financial help of UNESCO. Brussels, General Secretariat of U.R.S.I. [1953?] Its: *Special Report*, No. 2. 70 p. 18 figs., 4 tables, 54 refs., 31 eqs. Note: Report approved for publication, Sept. 1950. **DWB**—This report consists of a review of past progress and present theoretical and empirical knowledge of ionospheric tides (lunar and solar) and of the winds which result therefrom. The dynamo theory of magnetic variations and ionic drifts is also considered. The D, E, F1 and F2 regions are considered separately. Semi-diurnal pressure waves at the earth's surface give a clue to the upper atmospheric tides caused by sun and moon. *Subject Headings:* **1. Atmospheric tides 2. Ionospheric winds 3. Lunar ionospheric tides. I. Martyn, David Forbes II. Beynon, W. J. G. III. Chapman, Sydney IV. Egedal, J. V. McNish, Alvin Green VI. Weekes, K.**—*M.R.*

6D–182 551.594.7:523.74

Jacobs, George (*Dept. Editor, CQ*), **DX and the sun. Part I and II.** *CQ, Radio Amateur's Journal*, New York, 9(7):15–18, 60–61, July **1953**; 9(8):20–21, 59, Aug. **1953.** 7 figs., photo. **DWB**—This article has been written for the "DX-hound," the radio amateur ever eager to pick up a station from Distance X (the greatest possible distance) over high-frequency ionospheric radio communication. Pt. I gives basic knowledge on sunspot cycles and ionospheric conditions and on their effect on radio propagation. Diagrams showing past and present sunspot cycles and correlation between sunspot numbers and critical frequencies are presented. Daily and seasonal solar variations and their effects are also discussed and illustrated. Pt. II explains the role of the ionosphere in absorption of radio-waves of varying length and the effect of solar activity on this absorption; a forecast of general propagation conditions is given for 1953–56. *Subject Headings:* **1. Radio wave propagation 2. Solar activity.**—*G.T.* & *M.R.*

6D–183 551.510.535:551.594.7

Jacobs, George, **Ionospheric propagation conditions.** *CQ, Radio Amateurs' Journal*, New York, 9(7):41, 69, July **1953. DWB**—Regular column giving monthly outlook of radio propagation conditions, namely of possibilities in long-distance communication, atmospheric noise, ionospheric storminess and sporadic E or "short-skip" activity. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric disturbances.**—*G.T.*

6D–184 551.510.535:535.6

Jancel, Raymond and Kahan, Théo, **Phénomènes électromagnétiques dans l'ionosphère: Effets croisés d'un champ magnétique constant et d'un champ électrique oscillant.** [Electromagnetic phenomena in the ionosphere: combined effect of a constant magnetic field and an oscillating electric field.] *Académie des Sciences, Paris, Comptes Rendus*, 236(8):788–790, Feb. 23, **1953.** 4 refs., eqs. **DLC**—The effect of a constant magnetic field and an oscillating electric field on the velocity distribution of free electrons in an ionized medium is investigated by applying Boltzmann's general equation. The results obtained include the particular cases of Druyvesteyn, Chapman-Cowling and Margenau. *Subject Headings:* **1. Electromagnetic waves 2. Electron distribution 3. Ionosphere.**—*Transl. of authors' abstract.*

6D–185 551.510.535:538.66

Jancel, Raymond and Kahan, Théo, **Propagation des ondes électromagnétiques planes dans l'ionosphère.** [Propagation of plane electromagnetic waves in the ionosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 236(21):2045–2047, May 27, **1953.** refs. **DWB**—The propagation of electromagnetic waves is described by a dielectric tensor based on the Maxwell equations, computing the refraction indexes for particular cases. A formula for the attenuation of the waves and for group velocities is derived. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric propagation.**—*A.A.*

6D–186 551.510.535:621.396.029

*†Jones, Robert E., **Physical characteristics of the lower E-region as deduced from the measurement of changes in phase path of long radio waves.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 48, Aug. 25, **1953.** 88 p. 32 figs., 3 tables, 38 refs., 42 eqs. **DWB**—The diurnal and seasonal variations in phase height of the

main E region reflection level at 150 kc at State College, Pa., are reported for a period of 15 months. An electron density model, moderately "sharp" on the lower side, is evolved by modification of the Chapman theory to include the effects of variable scale height, dissociation of molecular oxygen, and variable recombination. This model is checked, primarily, against 150 kc phase height data, but also against 2.4 mc phase heights, height of maximum ionization, and critical frequency results. The comparison of periods of oscillation in phase with fading periods is shown to bear out the theoretical work on the ionospheric diffracting screen. *Subject Headings:* **1. E layer 2. Radio waves 3. Ionospheric reflection 4. State College, Pennsylvania.**—*Author's abstract.*

6D–187 551.510.535:551.521.1

†Kallmann, H. K., **Solar radiation effect upon the layer formation in the atmosphere.** California. University. Institute of Geophysics, Contract AF 19(604)-111, Scientific Report, No. 1, March 15, 1953. 23 p. 4 figs., 22 refs., 25 eqs. **DWB**—Several simplified models of the atmosphere and solar action thereon are used to determine the characteristics of such an atmosphere—especially with respect to the ionospheric layers and their formation or dissolution. The ionization is assumed to be entirely due to UV radiation from the sun; X radiation and ionization from meteorites, and dynamic processes (winds and turbulence) being neglected. A continuous layer formation is derived under conditions of quiet sun, with limits and intensity varying with the several basic models. The magnitude of the "drop" in height varies with the degree of solar disturbance as well as with the basic assumptions. Electron density is shown as a function of height in the E layer on several graphs. *Subject Headings:* **1. Ionospheric models 2. Solar radiation effects 3. Ionospheric layers.**—*M.R.*

6D–188 551.510.535:550.385

Kamiyama, Hiroshi (*Tohoku Univ.*), **The disturbance in the ionosphere accompanying the geomagnetic storm on April 18, 1951.** *Sendai, Japan. Tohoku Univ. Science Reports, 5th Ser. Geophysics*, 5(1):1–9, Aug. 1953. 9 figs., 2 tables, 9 refs. **MH-BH**—Characteristics of the disturbances in the F2 region during the magnetic storm of April 18, 1951 are analyzed from world-wide ionospheric data. The ionospheric disturbances are divided into two groups corresponding to the magnetic SD and Dst fields. The values of $h'F_2$ increased considerably during the main phase of the magnetic storm. The distribution of the deviations in $h'F_2$ suggest a close connection with magnetic latitude. In the Dst group electron density also decreased considerably during the main phase. The disturbances both in the height of the layer and the electron density occurred simultaneously everywhere except in the region of low latitude. *Subject Headings:* **1. Ionospheric disturbances 2. Geomagnetic disturbances 3. Magnetic storms.**—*Author's abstract.*

6D–189 551.510.535:550.38

Kamiyama, Hiroshi (*Tohoku Univ.*), **Disturbances in the ionosphere during the geomagnetic bay.** *Sendai, Japan. Tohoku University, Science Reports, 5th Ser., Geophysics*, 4(3):101–107 March 1953. 6 figs., 3 tables, 4 refs. **MH-BH**—This study is based on ionospheric data obtained from 35 stations throughout the world, during 65 geomagnetic bays reported from Kakioka Observatory, Japan. The ionospheric data are examined as to deviations of electron density in the F2 layer. A harmonic analysis of the deviations is added. The results are presented in graphical and tabular arrangement. *Subject Headings:* **1. Ionospheric disturbances 2. Electron density 3. Geomagnetic effects.**—*G.T.*

6D–190 551.510.53

Keller, Herbert B., **Ionospheric propagation of plane waves.** N. Y. Univ. Washington Square College. Mathematics Research Group, Contract AF 19(122)-42, Research Report, EM-56, Aug 1953. 41 p. fig., 13 refs., numerous eqs. **DWB**—The propagation of plane waves in a stratified ionosphere is considered. It is shown that the construction of "true" characteristic waves depend upon the diagonalization of a matrix by a Loewy transformation. For a homogeneous ionosphere this construction can always be carried out explicitly. For the general case we obtain the wave solution in terms of characteristic waves which have the properties usually attributed to characteristic waves in magneto-ionic theory. In addition, the interaction between these waves is made clear by the introduction of continuous reflection and transition coefficients. Ordinary and extraordinary wave-reflection levels are shown to be points at which the elementary divisors of a certain matrix become non-simple. Complicated expressions are obtained from which ionospheric reflection and transmission coefficients may be obtained explicitly. Explicit solutions are obtained for normally incident waves with an oblique earth's magnetic field and for oblique incident waves with a vertical earth's magnetic field. *Subject Heading:* **1. Ionospheric propagation.**—*Author's abstract.*

6D–191 551.510.535:538.

Keller, Herbert B., **On the electromagnetic field equations in the ionosphere.** N. Y. Univ. Washington Square College, Mathematics Research Group, Contract AF 19(122)-42, Researc

Report, EM-57, Sept. 1953. 17 p. fig., 5 refs., eqs. **DWB**—This paper consists of two notes on the equations governing the propagation of electromagnetic waves in the ionosphere. In Part I, the tensor properties of the ionosphere are derived by a method due to VAN DER WYCK. While we introduce only minor improvements on his method, it was felt worthwhile to make these results generally more available. Part II shows the equivalence of various forms of the propagation equations. A general scheme is indicated for finding simplifying transformations of the equations in their first-order form. In particular, we obtain that transformation which yields Rydbeck's coupled equations, and give an interpretation. *Subject Headings:* **1. Ionospheric propagation 2. Radio wave propagation 3. Wave propagation equations.**—*Author's abstract.*

6D–192 551.510.535:551.594.12

Kelso, John M., **Determination of the electron density distribution of an ionosphere layer in the presence of an external magnetic field.** Pennsylvania State Univ. Ionosphere Research Lab., Contract AF 19(122)-44, Scientific Report, No. 55, Dec. 30, 1953. 33 p. +appends. numerous figs., tables, 21 refs., eqs. Also in: *Journal of Atmospheric and Terrestrial Physics*, 5(1):11–27, March 1954. 5 figs., 3 tables, 21 refs., 31 eqs. **DWB**—An accurate method is given for the determination of the electron density distribution of an ionosphere layer in the presence of an external magnetic field. The shape of the layer is determined in the process of calculation, and is *not* assumed in advance. The electron density distribution is determined by finding the actual heights at which waves of various frequencies are reflected. These true heights are obtained from experimental h′-f curves by obtaining the exact solution, as a convergent series of integrals, of the integral equation giving the group height as a function of frequency. The errors arising in the numerical work are shown by applying the procedure to h′-f curves obtained theoretically from layers of known shape, and such errors are seen to be small compared with those made through use of other procedures. *Subject Headings:* **1. Electron density 2. Ionosphere.**—*From author's abstract.*

6D–193 621.396:551.510.535

Kelso, John M. (*Penna. St. Coll., Ionos. Res. Lab.*), **On the coupled wave equations of magneto-ionic theory.** *Journal of Geophysical Research*, 58(4):431–436, Dec. 1953. table, 8 refs., 8 eqs. **DLC**—The propagation of a plane radio wave incident vertically on an inhomogeneous ionosphere varying in the vertical direction in the presence of the terrestrial magnetic field is characterized by a pair of coupled wave equations. These equations can be changed in appearance by choosing various different forms for the time factor, coordinate system, particle charge, and wave functions. In the recent literature, this has led to some unfortunate confusion, which the present work is intended to clarify. The wave equations and the basic defining relations are presented in such a way as to show explicitly the effects of some of the possible arbitrary choices noted above. A table comparing the present notation with that used by various other authors is given. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric structure.**—*Author's abstract.*

6D–194 551.510.535

Lawrence, Robert S. (*Natl. Bureau of Standards, Wash., D. C.*), **Continental maps of four ionospheric disturbances.** *Journal of Geophysical Research*, 58(2):219–222, June 1953. 2 figs., 3 refs. **MH-BH**—Measurements of f°F2 at 13 North American ionospheric stations are used to study the geographical distribution of f°F2 deviations from normal and the changes with time during four ionospheric disturbances. In two of these, storm centers can be identified which appear to move across the maps during the disturbance. In the other two, the contours of percentage deviation are roughly directed east and west, and show relatively little change with time. *Subject Headings:* **1. Ionospheric disturbances 2. *f*oF2 distribution.**—*Author's abstract.*

6D–195 551.510.535

Le Gall, Jean; Mongin, Bernard and Munier, Henri, **Observations ionosphériques aux Iles de Kerguelen.** [Ionosphere observations in the Kerguelen Islands.] *Académie des Sciences, Paris, Comptes Rendus*, 237(16):927–928, Oct. 19, 1953. 2 tables. **DWB**—Ionospheric observations in the Kerguelen Islands have been conducted regularly since Feb. 1953. The results obtained show the great influence of magnetic inclination. *Subject Headings:* **1. Ionospheric data 2. Kerguelen Islands, Indian Ocean.**—*Trans. of authors' abstract.*

6D–196 551.594.7:621.396.11

McCue, C. G., **Concerning Green's reinterpretation of the magneto-ionic theory.** *Journal of Atmospheric and Terrestrial Physics*, 3(5):239–244, June 1953. fig., 12 refs., 19 eqs. **MH-BH**—A. L. GREEN (1949–50) justified his empirical maximum usable frequency (M.U.F.) formula by a new analysis of the magneto-ionic theory of radio transmission. Author considers that this modification of E. V. APPLETON's interpretation (1932) is incorrect. *Subject Heading:* **1. Long wave propagation.**—*C.E.P.B.*

6D–197 551.510.535

Maeda. Ken-ichi, **The conductivity of the ionosphere.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 110–122. 4 figs., table, 10 refs., 18 eqs. English and French summaries p. 122–123. **DWB**—Tensor expressions of anisotropic velocity and conductivity of a simple ionized gas in magnetic field are applied to the ionosphere as a heterogeneous ionized medium. It is shown that the vertical electric current in the ionosphere is suppressed down to a negligible magnitude, and under this condition the specific conductivities of the ionosphere are derived. With these conductivities the dynamo-theoretical equation is constructed and solved for some special models of the ionosphere. The directional conductivities of the ionosphere are introduced and explained. The vertical motion of electrons and ions in the ionosphere is considered and its importance is briefly noted from the viewpoint of the ionospheric distribution. *Subject Heading:* **1. Ionospheric conductivity.**—*Author's abstract.*

6D–198 551.510.535:550.38:621.396.11

Martin. L. H., **Ionospheric disturbance forecasting.** *British Institution of Radio Engineers, Journal*, 13:291–301, **1953.** 7 figs., 15 refs. **DLC**—The structure of the ionosphere is briefly described, and the critical frequencies by day and night, winter and summer, shown as a basis for prediction. The causes and effects of solar flare disturbances, periods of low layer absorption and ionospheric storms are described, including relations to magnetic storms and sunspots. From these relations a prediction method is based, combining the latest solar, geomagnetic and ionospheric data. *Subject Heading:* **1. Ionospheric disturbance forecasting.**—*C.E.P.B.*

6D–199 551.510.535:550.38

Martyn, D. F., **Region F2 in a magnetic storm.** *International Council of Scientific Unions, Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 78–83. 7 figs. **DWB**—Diurnal variations in critical frequency of F2 region at different latitudes and diurnal variations in difference between minimum height of F2 region on quiet and disturbed days are shown on graphs Fairbanks, Washington, Canberra, Watheroo, Scotland, Hawaii and Huancayo , to serve as basis for model of overhead electric current system as viewed from sun, and from North Pole respectively which could produce the S_D field. Generalizations as to time of commencement of magnetic storms same all over the world) and phase of diurnal variation of height and electron density 11 h at Fairbanks, and 07 h in equatorial zone) and commencement of ionospheric storm at all latitudes within 1 hour of commencement of magnetic storm are questioned by some of those participating in the discussion. *Subject Headings:* **1. F2 variations 2. Ionospheric storms 3. Diurnal ionospheric variations 4. Latitudinal ionospheric variations.**—*M.R.*

6D–200 551.510.535

Massey, H. S. W., **Recent laboratory measurements of recombination coefficients and the problem of ionospheric recombination.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 20–32. fig., refs., 2 eqs. **DWB**—After explaining the principle of microwave methods for the determination of electron density, author discusses the results of recent laboratory measurements of the rate at which the electron density decreases in a discharge afterglow in different gases—experiments carried out in helium by BIONDI and BROWN and hydrogen, nitrogen, oxygen, etc. Going to the problem of ionospheric recombination, he suggests that the effective recombination in the E, F1, and F2 layers is not due to radioactive recombination of positive ions and electrons or to attachments followed by intersonic recombination but rather to dissociative recombination, which also might be the dominant process in the D region. A discussion of the report follows. *Subject Headings.* **1. Recombination coefficients 2. Electron density.**—*A.M.P.*

6D–201 551.510.535:551.594.12

Mitra, A. P., **Atomic nitrogen as a constituent for region F1.** Pennsylvania. State College Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report No. 53, Nov. 10, **1953.** 29 p. 6 tables, 6 figs., 21 refs. **DWB**—The case of atomic nitrogen as a possible constituent for Region F1 is studied by examining simultaneously the problem of dissociation of molecular nitrogen and that of the ionization of the resulting nitrogen atoms. Both static and dynamic atmospheres have been considered for this purpose. It is shown that, under dynamic conditions, the maximum of ionization produced as a result of photoionization of atomic nitrogen lies between 150 to 200 km for overhead sun, the best value being somewhere around 170 km. Further, to give adequate ionization for the F1 layer, the concentration of atomic nitrogen at the height where diffusive separation takes place need not be larger than $\frac{1}{10}n(N_2)$. Possible contribution from the ionization of atomic oxygen at the third ionization potential has also been discussed. *Subject Headings.* **1. F1 layer ionization 2. Atomic nitrogen 3. F1 layer.**—*Author's abstract.*

6D–202 550.38:551.510.535

Möller, Hans Georg, **Beobachtung der 3. Komponente in mittleren Breiten.** [Observations of the 3rd component in middle latitudes.] *International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 153–159. 4 figs., 3 refs. English and French summaries p. 159. **DWB**—The angle at which the z component strikes the earth is measured. h^1-t-diagrams obtained at or just below the critical frequency of the z-component are shown. As the z-component is reflected from a small angular range only, the diagrams give new suggestions for the fine structure of the ionosphere. *Subject Headings:* **1. Ionospheric structure 2. Ionospheric z-component.**—*Author's abstract.*

6D–203 551.510.535:621.396

†Morgan, M. G., **A review of VHF ionospheric propagation.** *Institute of Radio Engineers, New York, Proceedings*, 41(5):582–587, May **1953.** numerous foot-refs. **DWB**—Five phenomena which make it possible for very high frequency signals (30–300 mc) to be propagated between two points on the earth by passing through the ionosphere are discussed. These are: 1) regular F2 ionization, 2) sporadic E ionization, 3) scattering from the regular ionization, 4) auroral ionization and 5) meteoric ionization. The paper is based mainly on information available in the U. S. and Canada. *Subject Headings:* **1. Radio wave propagation 2. Reviews.**—*G.T.*

6D–204 551.510.535

Nertney, R. J., **The lower E and D region of the ionosphere as deduced from long radio wave measurements.** *Journal of Atmospheric and Terrestrial Physics*, 3(2):92–107, Feb. **1953.** 31 figs., table, 13 refs. Also issued as: Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Ionospheric Research, Scientific Report, No. 39, June 20, **1952.** 78 p. 35 figs., table, 27 refs., eqs. **DWB**—Model electron distributions for E and D layers are set up, based on experiment and theory, for noon (summer) and for night. Conclusions from models are compared with observed heights of critical layers. *Subject Headings:* **1. Ionospheric structure 2. E layer 3. D layer.**—*C.E.P.B.*

6D–205 551.501.83:016

Nupen, Wilhelm; Rigby, Malcolm and Martinoff, Katherine, **Selective annotated bibliography on thunderstorm sferics.** *Meteorological Abstracts and Bibliography*, Boston, 4(11):1304–1359, Nov. **1953.** 295 refs. **DWB**—This annotated bibliography on thunderstorm sferics contains several papers on electromagnetic wave propagation (*see* 4K–1, –3, –5, –9, –14 and –86) and several on the ionosphere (*see* 4K–76, –83 and –286). (*Same item as* 6B–175, Feb. 1955, *MAB.*) *Subject Headings:* **1. Sferics bibliographies 2. Radio wave propagation 3. Ionosphere.**—*M.L.R.*

6D–206 551.510.535

Perers, Olof F., **Ionospheric observations made by the Swedish Solar Eclipse Expedition to Italy on February 25, 1952.** *International Council of Scientific Unions, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 50–62. 9 figs., 8 refs., eqs. **DWB**—Preliminary results of ionospheric soundings by means of a fast running recorder (Panoramic) and of solar noise measurements on 2 meter wave length during the solar eclipse, which was partial in Italy, are presented. $h'f$-traces of E and F2 layers were observed also visually with a good time calibration of the frequency sweep because of the small eclipse effects. The behavior of E, F1 and F2 layers is described and shown graphically. It was more complex in the F2 layer where instead of decreasing, the critical frequency increased during the initial phase and then fell to a relatively constant value. The solar noise intensity showed a greater reduction than could be theoretically expected. *Subject Headings:* **1. Ionospheric soundings 2. Solar eclipses.**—*A.M.P.*

6D–207 551.510.535-538.56:516

Pfister, Wolfgang, **Magneto-ionic multiple splitting determined with the method of phase integration.** *Journal of Geophysical Research*, 58(1):29 40, March **1953.** 9 figs., 6 refs. **DWB**—The method used is a first-order W.K.B. approximation with an integration path in the complex height plane. The refractive index *versus* height is represented on a Riemann surface with four sheets corresponding to upgoing and downcoming waves and ordinary and extraordinary types of polarization. The branch points connecting the sheets are characterized as reflection points or as coupling points. Suitable paths of integration in the Riemann surface determine the reflection coefficient for the various magneto-ionic components. Five possible fundamental components have been found, and an infinite number of additional components due mainly to multiple reflections between the different reflection points. Numerical computations have been carried out for one ionospheric model with a Chapman distribution of electrons and an exponential decrease of collision frequency located in a moderate magnetic latitude. The results are represented in a sweep frequency picture of virtual height and absorption for five fundamental modes of propagation. *Subject Headings:* **1. Ionospheric research**—*Author's abstract.*

6D–208 551.510.535

Piggott, W. R., **Abnormalities in the ionosphere at high latitudes.** *Nature*, London, 171(4342): 124–125, Jan. 17, **1953.** 2 figs., 2 refs. **DLC**—Study of variations of frequency of occurrence of both abnormal E and intense D ionizations at high latitudes during periods of magnetic disturbance. Within the "storm belt" the disturbances are particularly frequent and intense. The probability of occurrence of both "storm-E" and "storm-D" ionizations shows a diurnal variation with a maximum. The local time at which this maximum is found varies in a remarkable manner with longitude for storm-D, but is practically independent of longitude for storm-E. Further, while the probability of occurrence of storm-D is almost constant throughout the western hemisphere, the most dense forms of storm-E are practically confined to a zone centered near Canada. *Subject Headings:* **1. Ionospheric storms 2. Magnetic disturbances.**—*Physics Abstracts, No. 2845, 1953.*

6D–209 551.510.535

Roy R. and Verma, J. K. D. (*Inst. of Nuclear Physics, Calcutta*), **Irregularities in the ionosphere.** *Journal of Geophysical Research*, 58(4):473–485, Dec. **1953.** fig., 12 plates, refs. **DLC**—Electron clouds, both in the E and F regions of the ionosphere have been detected at vertical incidence by means of a high-precision ionosphere sounding equipment. The clouds give rise to scattered echoes, which are delineated on an expanded sweep as individual pips, resolved out from the normal echoes. An estimate of the received power by back-scattering, made on the basis of the theory of tropospheric radio scattering by BOOKER and GORDON, shows that it is far in excess of the receiver noise power. Some of the records indicate that sometimes at night the normal layer structure of the ionosphere ceases to hold; the ionospheric regions then contain only electron clouds at different heights. The scattered echoes generally appear for a very short duration. The short persistence (1 to 2 minutes) of these echoes has been explained by considering the drift of the clouds by the upper air winds. *Subject Headings:* **1. Ionospheric structure 2. Electron clouds.**—*Authors' abstract.*

6D–210 551.510.535:551.594.7:535.51

Scott, James C. W. (*Defence Res. Telecom. Establ., Defence Res. Board, Ottawa*), **Real and complex wave polarization in the ionosphere.** *Journal of Geophysical Research*, 58(4):437–443, Dec. **1953.** 3 figs., table, 4 refs., 13 eqs. **DLC**—The relation between the polarization ellipse in the wave front and the complex polarization at vertical incidence in a slowly-varying horizontally-stratified ionosphere is reviewed. Charts and a table are given showing the sense, orientation and eccentricity of the polarization ellipse under all conditions of plasma frequency, collisional frequency, wave frequency, and magnetic field intensity and direction. *Subject Headings:* **1. Ionospheric polarization 2. Ionospheric reflection.**—*Author's abstract.*

6D–211 551.510.535:621.396

Shapley, A. H., **On forecasting propagation disturbances to radio communications in Alaska.** *Alaskan Science Conference, 2nd, Mt. McKinley National Park, Sept. 4–8, 1951, Proceedings*, p. 281–282, pub. [1953]? **DWB**—Advance warning of radio communication conditions in the North Pacific and Alaska is being attempted by North Pacific Warning Service by the National Bureau of Standards Field Station at Anchorage, Alaska. Variations in radio propagation are closely associated with abnormal conditions in the ionosphere. Studies of absorption, E_s movements, turbulence, fading, etc. are being undertaken. *Subject Headings:* **1. Ionospheric forecasts 2. Radio wave propagation disturbances 3. Ionospheric storm warnings 4. Alaska.**—*M.R.*

6D–212 551.510.535:621.396.11

Shmoys, J., **Low frequency propagation in an exponential ionospheric layer.** N. Y. Univ. Washington Square College of Arts and Science. Mathematics Research Group, Contract AF 19(122)-42, Research Report, No. EM-51, April **1953.** 16 p. 3 figs., 6 refs., 67 eqs. **DWB**—Recently, HEADING and WHIPPLE treated the problem of propagation of long radio waves in an exponential ionospheric layer. They dealt with the case of an obliquely incident plane wave, a vertical magnetic field, and low collision frequency. The case treated here is that of vertical incidence, oblique magnetic field, and both low and high collision frequency. The results obtained do not agree with experimental data. This is probably due to the fact that coupling effects were neglected. An example is given in the Appendix which shows that the omission of coupling terms, however small their coefficients may be, is not always justified. *Subject Headings:* **1. Exponential layer 2. Ionospheric wave propagation 3. Collisional frequencies.**—*Author's abstract.*

6D–213 551.510.535:551.594.7

Silberstein, Richard, **High-frequency scatter sounding experiments at the National Bureau of Standards.** *Science*, 118(3078):759–763, Dec. 25, **1953.** 4 figs., 13 refs. **DLC**—The four methods of studying backscatter echoes used at NBS since 1946 are reviewed, their basic principles explained, their merits and shortcomings discussed. Sample recordings obtained with each of the

methods are presented. The techniques described are: 1) intensity *vs* range photography at fixed frequency, 2) range-time recording at fixed frequency, 3) plan position indicator representation and 4) the sweep frequency technique. *Subject Heading:* **1. Ionospheric scattering.**—*G.T.*

6D–214 551.510.535:550.385

Sinno, Kenzi (*Radio Res. Lab., Tokyo*), **On the variation of the F2 layer accompanying geomagnetic storms.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 7(1):7–14, **1953.** 5 figs., table, 5 refs., 4 eqs. **DWB**—The separation of the variations in foF2 and h'F2 accompanying geomagnetic storms into two parts depending on the universal and the local time, respectively, has been attempted by the same method as the one employed in the case of geomagnetic force components. The seasonal and latitudinal characteristics of the two parts and the developing process of the local-time part of the variations have been revealed. The deductions from the above are that the variation in the local-time part is excited by the so-called "*Sd* current" associated with the geomagnetic storm and that any trace of moving disturbance from the auroral zone reported by some workers is not clear enough to be found. *Subject Headings:* **1. F2 layer variations 2. Geomagnetic storms.**—*Author's abstract.*

6D–215 551.510.535

Stimson, Thomas E., Jr., **The sky unfolds its mysteries.** *Popular Mechanics Magazine*, Chicago, 99(3):97–102, 256, 258, March **1953.** photos., illus. (some in color). **DWB**—A vivid sketch of conditions prevailing in the upper atmosphere is drawn for the general public with a novel pseudo-spherical model of the atmosphere presented in color. Composition of the air, pressure, temperature and winds prevailing up to several hundred miles, jet streams, auroras, the light of the night sky are discussed and some of the current upper air research is mentioned. *Subject Headings:* **1. Upper atmosphere models 2. Upper atmosphere research.**—*G.T.*

6D–216 551.510.535

Theissen, Emil, **Quelques résultats relatifs à la fréquence critique et au facteur de transmission de la couche ionosphérique F1.** [A few results concerning critical frequency and propagation factor of the ionospheric F1 region.] *Académie des Sciences, Paris, Comptes Rendus*, 237(18):1104–1106, Nov. 2, **1953.** 3 refs., 5 eqs. **DWB**—Assuming z for zenithal angle of the sun and k for critical frequency at $z=0$, the author proposes two formulas representing (1) critical frequencies: $foF_1 = k \cos^n z$; and (2) propagation factor: $(M3000)F_1 = M_0 \cos^m z$. From measurements made at Freiburg, values of n and m are given as 0.22 and 0.08 ($\pm$0.02) respectively. Data available for Freiburg and for Washington are discussed. A relation between ionospheric propagation and solar activity is indicated. *Subject Headings:* **1. Ionosphere foF1 critical frequencies 2. Radio wave propagation 3. Freiburg, Germany.**—*G.T.*

6D–217 551.594.7:621.396:06

Union Radio Scientifique Internationale (U.R.S.I.). [International Scientific Radio Union.] *International Union of Geodesy and Geophysics, Bulletin d'Information*, 2(2):362–370, April **1953.** **DWB**—First assembly in Sydney, Australia under Presidency of Sir Edward Appleton Aug. 11–21, 1952 attended by 300 delegates, 50 from overseas. Commissions dealing with measurements, tropospheric waves, ionospheric waves, sferics, radio astronomy, etc. met during the session. It was decided not to publish the documents presented at the meeting but to publish Special Reports of the U.R.S.I. from time to time on such subjects as ionospheric storms, meteors, wave interaction, etc. *Subject Headings:* **1. International Scientific Radio Union 2. Radio meteorology 3. Conferences.**—*A.A.*

6D–218 551.510.535:550.38

von Harlem, Jürgen, **Messung des erdmagnetischen Feldes in grossen Höhen mittels Raketen.** [Measurement of the geomagnetic field at great heights with rockets.] *Naturwissenschaftliche Rundschau*, 6(11):447–448, Nov. **1953.** fig. **DWB**—Ascents at White Sands and in Peru confirm that there is a magnetic field in the E layer. Rate of decrease of earth's field with height agrees with that calculated for a dipole up to a height of about 100 km within limits of error, and from there to peak height at 114 km shows, on magnetically disturbed days, a more rapid decrease. *Subject Headings:* **1. E layer 2. Terrestrial magnetism.**—*C.E.P.B.*

6D–219 551.510.535

Weiss, A. A., **The structure of the F region of the ionosphere.** *Australian Journal of Physics*, 6(3):291–303, Sept. **1953.** 5 figs., 12 refs., 15 eqs. **DWB**—The effects of temperature cycles, of a decay coefficient non-uniform with height and of vertical tidal drifts upon the structure of the F region of the ionosphere are considered. Special attention is devoted to the behavior of the level at which the maximum electron density occurs. Both decay by recombination and decay by attach-

ment are examined. It is concluded that the diurnal and seasonal height variations of the F2 region are not the result of vertical tides alone acting on an isothermal Chapman region. A qualitative explanation of these variations is obtained by postulating, in addition, a diurnal temperature cycle, provided the decay coefficient does not change rapidly with height. Under the alternative hypothesis, that a single ionization process forms both F1 and F2 regions by bifurication when the decay coefficient changes rapidly with height, the height variations appear to require discontinuities in the height gradient of the decay coefficient; tidal drifts are still necessary but a diurnal temperature cycle, if it exists, is not of major importance. *Subject Headings:* **1. Structure of the F layers 2. Electron density 3. Recombination processes.**—*Author's abstract.*

6D–220 551.557:551.510.535:016

†Wiewall, Miguel, Jr.; Medina Hernández, José and García de Quevedo, José L., **Bibliography on the literature of the ionosphere pertaining to ionospheric winds.** Puerto Rico. Univ. College of Agriculture and Mechanic Arts, Mayaguex, Contract AF 19(122)-476, Scientific Report, No. 1, **1953.** 89 p. **DWB**—Pt. I contains abstracts of over 150 papers published during the past 50 years, on the subject of high level winds mainly from telescopic and radio meteor trail observations, radio fading (sporadic E layer data), etc. Pt. II is a logical summary of the knowledge gained from these studies. An author and subject index are included. (*Same item as* 5.10–167, Oct. 1954, *MAB.*) *Subject Headings:* **1. Ionospheric wind bibliographies 2. Bibliographies.**—*M.R.*

6D–221 551.510.535:551.590.24

Zanotelli, Guglielmo, **Su alcune anomalie della frequenza critica ionosferica durante un'eclisse di sole.** [Anomalies of the critical frequency of the ionosphere during solar eclipses.] *Annali di Geofisica*, Rome, 6(3):367–372, July **1953.** 2 figs., 3 refs. In Italian; English summary p. 372. **MH-BH**—The results of the ionospheric soundings carried out in Rome during the partial eclipse of the sun of February 25, 1952 are presented here. Three minima were found in the electronic concentration; one before the beginning of the eclipse, one for the maximum phase, and one at the end of the eclipse. It is shown, admitting that the cause of the two extreme minima is to be found in the external zone of the visible part of the solar disk, that one can explain the otherwise inexplicable retard of the last minimum with respect to the visible eclipse, and one can interpret, at the same time, strong apparent variation in the coefficient of recombination of the ionospheric electrons. *Subject Headings:* **1. Ionospheric variations 2. Solar eclipse effects 3. Rome, Italy.**—*Author's abstract.*

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6D–222 551.510.535

Agy, Vaughn, **Motion of the storm-D regions.** *Nature*, London, 173(4401):445–446, March **6, 1954.** 3 figs., 3 refs. **DWB**—Variation of black-out due to excessive absorption is shown by charts of average probability, its amplitude, and time of maximum. No indication of a 48 hr rotation was found. *Subject Headings:* **1. D layer 2. Ionospheric variations.**—*C.E.P.B.*

6D–223 551.510.535:621.396.11:558.566.3

Allcock, G. McK., **Ionospheric absorption at vertical and oblique incidence.** *Institution of Electrical Engineers, London, Proceedings*, Pt. 3, 101(74):360–367, Nov. **1954.** 11 figs., table, 24 refs., 15 eqs. **Discussion on the above paper, and [on] two other papers on the ionospheric absorption and reflection of radio waves, before the Radio Section, 5th May, 1954.** *Ibid.*, p. 367–370. **Authors' replies to the above discussion.** *Ibid.*, p. 370. **DLC**—Measurements of the ionospheric absorption of radio waves of frequency 9.15 Mc/s over an 800-km path, and of frequency 5.455 Mc/s at vertical incidence at the mid-point of this path, have been made simultaneously over a period of 14 months. A discrepancy between the observed results and those predicted by Martyn's absorption theorem is found, which varies diurnally. The oblique-incidence results are examined in detail, and empirical formulas for diurnal and seasonal variation of absorption are derived. *Subject Headings:* **1. Ionospheric absorption 2. Ionospheric reflection 3. Radio wave propagation.**—*Author's abstract.*

6D–224 551.510.535

Appleton, Edward V., **The anomalous equatorial belt in the F2-layer.** *Journal of Atmospheric and Terrestrial Physics*, 5(5/6):348–351, Nov. **1954.** 3 figs., 16 refs. **DWB**—The abnormal upward distension of F2 layer along a strip 4000 km wide centered on magnetic equator at noon, associated with low N_m, is replaced by abnormally high N_m at 18 h, disappearing rapidly after 0 h. This crest is attributed to contraction of vertical extent. Curves of fF2 (Mc/s) 80°N–80°S, March 1951 are shown for 12, 21 and 9 h local time. *Subject Heading:* **1. F2 layer.**—*C.E.P.B.*

6D–225 551.510.535

Bailey, V. A., **Study of the reflexion of waves from an inhomogeneous medium by means of a new first approximation to a solution of the general, linear, second-order differential equation and**

by means of iterations with convergence of the second order. Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 67, Aug. 1, **1954.** 52 p. 16 refs., numerous eqs. **MH-BH**—The propagation of a plane wave through three media, A, B, C in succession, of which only A and B are homogenous, is studied and two formulas are obtained for the coefficient of reflection ρ in terms of solutions y and u of the Riccati equation corresponding to the one-dimensional wave equation and of the wave equation itself. Application to current work on reflection of long radio waves from D region pointed out. *Subject Headings:* **1. Ionospheric reflection 2. D region.**—*From author's abstract.*

6D–226 551.510.535:621.396.029

Baird, K., **High multitude radio reflections from the F2 layer of the ionosphere at Brisbane.** *Australian Journal of Physics*, 7(1):165–175, March **1954.** 5 figs., 2 tables, 5 refs. **MH-BH**—Continuous night-time records of multiple F2 reflections at normal incidence have been made at a fixed frequency. The echo patterns have been classified, and qualitative explanations given in terms of humped ionization contours, extending the work of Pierce and Mimno (1940). These patterns have been studied also by a variable gain technique. It is concluded that accurate measurements of reflection coefficients cannot be made by this means. Statistical analyses of occurrences of up to the 10th multiple showed that: a) if no account is taken of presence of absence or E_s, the frequency of occurrence increases towards dawn; b) there is no correlation between the number of reflections observed and the virtual height of the region; c) there is no correlation with "range duplications"; d) inverse correlation between high multiple F reflections and presence of E_s occurs only when the lower region is blanketing; e) there is no correlation between high multiples and the travelling disturbances described by Munro. A study of the presence of very high multiples revealed maxima at the equinoxes. Oblique incidence recording gave no reflections beyond the fifth multiple. *Subject Headings:* **1. F2 layer 2. Ionospheric radio wave reflection 3. Brisbane Australia.**—*Author's abstract.*

6D–227 551.510.535:551.594.7

Banerji, R. B., **Autocorrelogram of randomly fading waves with applications to wind measurements at 150 kc/S.** Pennsylvania State Univ. Ionosphere Research Lab., Contract AF19(122)-44, Scientific Report, No. 59, March 15, **1954.** 29 p. 6 figs., table, 7 refs., 30 eqs. **DWB**—The greatest difficulty in the computation of wind velocities from the autocorrelogram analysis of radio wave fading patterns has so far been supposedly random fluctuations of the derived autocorrelograms. A method is developed to test the significance of autocorrelograms. It is shown that no more than 250 independent data on the original fading pattern are needed to distinguish between turbulent and drift velocities. The power spectrum that can be expected from an irregular ionosphere is also considered. It is found that the autocorrelograms of the fading of 150 Kc/s waves obtained bear out these discussions. The orientation of the antennae seems to have a very profound influence and it may be expected that the fading observed with two adjacent aerials at different orientations may yield as much information regarding wind velocities as spaced receiving aerials. *Subject Headings:* **1. Ionospheric winds 2. Radio fading.**—*From author's abstract.*

6D–228 551.510.535:621.396.029

Beynon, W. J. G., **Some notes on the absorption of radio waves reflected from the ionosphere at oblique incidence.** *Institution of Electrical Engineers, Proceedings*, Pt. 3, 101(69):15–20, Jan. **1954.** 7 figs., 2 tables, 9 refs. **DLC**—The results of some oblique-incidence measurements on the ionospheric absorption of radio waves are considered. For both short and very long distances of transmission it is found that there is a marked discrepancy between the observed values and the values calculated from simple theoretical formulas. The contribution of multiple ionospheric reflections to the intensity of the received signal is briefly discussed. *Subject Headings:* **1. Ionospheric radio wave reflection 2. Ionospheric absorption.**—*Author's abstract.*

6D–229 551.510.535

Beynon, W. J. G. and Davies, K., **Simultaneous ionospheric absorption measurements at widely separated stations.** *Journal of Atmospheric and Terrestrial Physics*, (5(5/6):273–289, Nov. **1954.** 10 figs., 3 tables, 6 refs. **DWB**—Comparison of normal incidence 2 Mc/s ionospheric absorption at Slough and Swansea (230 km apart E–W) shows correlation of 0.74 for year (winter 0.85, summer 0.81). On about 6 Mc/s Slough with Freiburg (400 km) gives 0.40, Swansea with Skelton (330 km) 0.68, Swansea with Allous (666 km) 0.40. Correlation falls off with distance more rapidly in winter than summer. Some calculations are made of monthly mean ionospheric absorption on 6 Mc/s. *Subject Heading:* **1. Ionospheric absorption.**—*C.E.P.B.*

6D–230 551.510.535

Bossolasco, Mario and Masotto, Antonio, **La constituzione dell'alta atmosfera e la Stazione Ionosferica dell'Istituto Geofisico di Genova.** [The constitution of the upper atmosphere and the

Ionospheric Station of the Geophysical Institute of Genoa.] *Geofisica e Meteorologia*, Genoa, 2(5/6):80–86, Sept./Dec. **1954.** 4 figs., 2 eqs. **DWB**—The physical and chemical characteristics of the ionosphere, its role in radio transmission, the electrical density of its various layers, and its ionization phenomena are reviewed and the ionospheric station of the Geophysics Institute of the University of Genoa is described with the aid of a diagram. *Subject Headings:* **1. Ionospheric composition 2. Ionization.**—*I.L.D.*

6D–231 551.510.535:621.396.11

Bracewell, R. N., **Analogues of an ionized medium. Applications to the ionosphere.** *Wireless Engineer*, London, 31(12):320–326, Dec. **1954.** 12 figs., 2 tables, 2 refs., 24 eqs. **DLC**—A continuous transmission line with series impedance and shunt admittance is compared with a representation of linearly polarized plane waves, first in non-ionized free space and then in an ionized medium. Effect of collisions between an electron and positive ions or neutral molecules is equivalent to a mechanical impedance on its motion. Cases of inhomogeneous media are next dealt with and the mechanical analog of a flexible spring strip is introduced. Finally, a partial analogy is drawn between a plane wave in an ionized medium and a wave in a wave guide. *Subject Heading:* **1. Ionospheric analogs.**—*C.E.P.B.*

6D–232 551.510.535:551.557

†Briggs, B. H. and Spencer, M., **Horizontal movements in the ionosphere.** *Physical Society of London, Reports on Progress in Physics*, 17:245–280, **1954.** 21 figs., 4 tables, 40 refs. **DWB**—In the E region closely spaced receivers and meteor observations give a mean velocity of 80 m/s and regular diurnal variations represented by a vector of 30 m/s rotating clockwise (in N. Hemisphere) in 12 hours, directed N at 0300 and 1500. In summer a mean velocity of 50 m/s towards E is superposed. An upward increase of about 3.6 m/s per km has been observed. In the F region there is a component averaging 100 m/s towards E with diurnal variation and with changes in periods of magnetic disturbance. There is a component towards N in summer and S in winter (in N. Hemisphere). Results of non-radio methods are briefly summarized. *Subject Headings:* **1. Ionospheric movements 2. Northern Hemisphere.**—*C.E.P.B.*

6D–233 551.510.535

Chatterjee, B., **Some comments on "The solar control of the E and F1 layers at high latitudes."** *Journal of Geophysical Research*, 59(3):435, Sept. **1954. MH-BH**—Cautions against too far reaching conclusions from foE data for Calcutta, as was done in recent papers by SCOTT and by SAHA. A manual recorder, as used in Calcutta, cannot be as reliable as automatic or panoramic recorders. *Subject Headings:* **1. Ionospheric measurements 2. Calcutta, India.**—*A.A.*

6D–234 551.510.535:551.594.12

Chatterjee, B. (*Inst. of Radio Physics and Electronics, Univ. of Calcutta, Calcutta*), **Some regularities of the ionospheric F region.** *Journal of Geophysical Research*, Washington, D. C., 58(3):353–362, Sept. **1953.** 5 figs., 12 refs. Also his: **Regularities in the F-region of the ionosphere.** *Nature*, London, 173(4397):262–264, Feb. 6, **1954.** 2 figs., 3 refs. **DWB**—It has been shown recently by RATCLIFFE that, although the behaviour of the critical frequency (and hence the maximum ionization density) of the F2 region is very irregular, that of its total ion content regularities observed by RATCLIFFE are confined only to a few stations and disappear when the F1–F2 bifurcation is large. It is shown in the present paper that if, instead of the total ion content of the F2 region, that of the F1 *cum* F2 region (n_T) is considered as a whole, then the regularities become much more marked. Further, the regularities are found to persist for all the three stations considered—Slough (Northern Hemisphere), and Singapore (equatorial region)—even when the bifurcation is large. Certain peaks, however, are found to occur on the otherwise smooth variations of the monthly mean values of n_T. These are explained as due to tidal effects. The paper also shows that the observed regularities of the composite F region are in conformity with the recent hypothesis that F1 and F2 belong really to one ionized region, being produced by a common ionizing radiation from the sun. *Subject Headings:* **1. F layer critical frequencies 2. Ion density 3. Ion content of F layers.** —*Author's abstract.*

6D–235 551.510.535

Chestnov, F. I., **Zagadka ionosfery.** [Enigma of the ionosphere.] Moscow, Gosud. Izdat. Tekhniko-Teoreticheskoĭ Literatury, **1954.** 54 p. 24 figs. *Nauchno-populiarnaia Biblioteka*, No. 70. **DLC**—The detailed structure of the ionosphere is described and shown in an original schematic diagram. Ionization, twilight, night sky light, aurora, diurnal effects, magnetic field, magnetic storms in ionosphere, solar effects, radio propagation (long and short wave), ionospheric soundings by radio impulses, sunspot effects, forecasts of radio propagation, meteor traces, radio radiation from stars and rocket exploration of ionosphere are treated in condensed popular-technical form. *Subject Headings:* **1. Ionospheric structure 2. Radio wave propagation.**—*M.R.*

6D–236 621.396.11:551.510.535

Clemmow, P. C. and Heading, J., **Coupled forms of the differential equations governing radio propagation in the ionosphere.** *Cambridge Philosophical Society, Proceedings*, 50(2):319–333, April **1954.** 15 refs., 73 eqs. **DLC**—The equations for oblique propagation in a horizontally stratified ionosphere with an oblique magnetic field are put in a form suitable for solution by successive approximations. In the general case this "coupled" form consists of four first-order differential equations, each associated with one characteristic wave. In the special cases of (a) horizontal magnetic field, and (b) plane of incidence perpendicular to magnetic meridian, two second-order coupled equations of a particular type can be derived, each associated with a pair of corresponding upgoing and downgoing characteristic waves. These latter equations include those given previously by FOSTERLING (1942) for vertical incidence. Cases in which there is no coupling are briefly considered from the point of view of the first-order equations. The general formulation provides a basis for assessing the validity of the standard "ray" approximation, alternative to that developed by BOOKER (1936), and brings out the nature of its breakdown in coupling and reflection regions. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric reflection.**—*Authors' abstract.*

6D–237 523.78:551.510.535

Delobeau, Francis, **Observation d'une éclipse partielle de soleil le 1er septembre 1951.** [Observation of a partial eclipse of the sun on September 1, 1951.] *Annales de Géophysique*, 10(2):148–151, April/June **1954.** 7 figs., 3 eqs. **DWB**—Results of measurements of critical frequency for the E layer during a partial eclipse are presented. The relation of critical frequency to solar activity is mathematically analyzed. An active sunspot near the edge of the solar disc was observed in the course of the eclipse. *Subject Headings:* **1. E layer 2. Ionospheric reflection 3. Solar eclipses.** —*G.T.*

6D–238 550.376:550.385:551.510.535

De Voogt, A. H., **The use of earth-potential measurements for magnetic and ionospheric storm indication.** *Journal of Atmospheric and Terrestrial Physics*, 5(2):108–110, May **1954.** 3 figs. **DWB**—Describes and illustrates measurements of earth-potential difference between points on Netherlands ground telephone cables, along E–W and N–S magnetic meridians through de Bilt. Perfect agreement with magnetograms was obtained. *Subject Headings:* **1. Geoelectric disturbances 2. Magnetic disturbances. 3. Ionospheric storms.**—*C.E.P.B.*

6D–239 551.510.535:538.566

Dieminger, Walter, **Neue Erkenntnisse über die Entstehung der Streustrahlung bei Kurzwellen und ihre praktische Bedeutung.** [New knowledge of the scattering of short waves and its practical importance.] *Umschau*, 54(10):300–303, May 15, **1954.** 6 figs., 9 refs. **DGS**—An account of results of recent research at Lindau/Harz and Stanford Univ., California, with diagrams of reflection at F layer and scattering at earth's surface or occasionally at sporadic E layer. Scattering is mainly due to irregularities of earth's surface. Echo soundings can explore the ionosphere not only directly above the transmitter but for some thousands of km around it. *Subject Heading:* **1. Ionospheric research.**—*C.E.P.B.*

6D–240 551.510.535:523

Dieminger, Walter (*Inst. für Ionsophärenforschung Max-Planck-Gesellschaft, Lindau*), **Über die Wirkung solarer Kropuskeln in der Ionosphäre.** [Changes in the ionosphere from solar corpuscles.] *Archiv der Elektrischen Übertragung*, Stuttgart, 8(6):259–268, June **1954.** 16 figs., 32 refs. English summary p. 259. **DLC**—The paper discusses typical changes occurring in the ionosphere during the penetration of solar corpuscles inside and outside the zone of northern lights. This is followed by a report on an extension of the theory of CHAPMAN-FERRARO by MARTYN that allows the observed phenomena in the ionosphere and in terrestrial magnetism to be explained in the same basic manner. The essential idea is here that the corpuscles emitted from the "ring current" transfer the radial field of polarization of this current to the zone of northern lights. The meridional electrical field set up there brings current systems into motion and modifies as a secondary effect the distribution of the charge carriers in the F2 layer. *Subject Headings:* **1. Solar corpuscles 2. Ionospheric variations.**—*Author's abstract.*

6D–241 551.510.535

Dungey, J. W., **Electrodynamics of the outer atmosphere.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 69, Sept. 15, **1954.** 52 p. refs. p. 52, eqs. **MH-BH**—Because of relative motion between the Earth and the interplanetary gas the geomagnetic field is confined to the inside of a Chapman-Ferraro cavity. The physics of the charged particles and electromagnetic field inside this cavity, but above the ionosphere, is studied. Their static condition is described by isothermal diffusive equilibrium and hydrogen

is predominant. STOREY's value of the electron density is adopted. The dynamics of the outer atmosphere may be described in terms of ALFVÉN waves. The normal modes of oscillation are discussed and it is also shown that travelling waves must be generated at the outer surface, because of the motion of the interplanetary gas. The possible applications of this study to geomagnetic micropulsations and to travelling disturbances in the ionosphere are considered. *Subject Headings:* **1. Upper atmosphere research 2. Electron density 3. Ionospheric disturbance.**—*Author's abstract.*

6D–242 551.510.535:538.3

Dungey, J. W., **Propagation of Alfvén wave through the ionosphere.** Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(122)-44, Scientific Report, No. 57, Feb. 15, **1954.** 19 p. table, 4 refs., 22 eqs. **DWB**—As a preliminary to a study of micropulsations, it is necessary to investigate the propagation of Alfvén waves through the ionosphere. General results are obtained for waves travelling parallel to the magnetic field, and approximations are then made, which are valid for periods of the order of a minute. Numerical values are given for the ionosphere and results are given for the simple case when the magnetic field is vertical. An approximate discussion is also given of waves propagated obliquely to the magnetic field. *Subject Headings:* **1. Ionospheric propagation 2. Magnetic fields 3. Alfvén's theory.**—*Author's abstract.*

6D–243 551.510.535:551.524.7

Gardner, F. F., **Ionospheric thermal radiation at radio frequencies, Pt. 2, Further observations.** *Journal of Atmospheric and Terrestrial Physics*, 5(5/6):298-315, Nov. **1954.** 11 figs., 2 tables, 10 refs., eq. **DWB**—Radio noise on 2 Mc/s at Urisino (30°S. 144°E.) a very quiet site in Australia, is attributed almost entirely to ionospheric thermal radiation. Temperatures (200–250°K) show no diurnal variation but vary greatly from day to day especially in summer, and increase by up to 40°K on SID days. Polarization measurements in Sept. 1951 showed that the extraordinary component was absorbed at a lower ionosphere level 20°K warmer than ordinary component, indicating that temperature decreased with height. Measurements fit temperature-height model given by rockets but about 40°K warmer, giving minimum of 217°K at 80 km. Some observations of noise of tropospheric origin are described. (For Pt. I *see* 5.3-37, March 1954, *MAB.*) *Subject Headings:* **1. Ionospheric temperatures 2. Ionospheric absorption 3. Urisino, Australia.**—*C.E.P.B.*

6D–244 551.510.535:621.396.11

*Gautier, T. N., Jr. and Sargent, C. J., **Prediction of the likelihood of interference at frequencies of 30 to 42 megacycles in Alaska.** *U. S. National Bureau of Standards, Journal of Research*, 52(1): 21–31, Jan. **1954;** *Research Paper*, No. 2468. 50 figs., 3 refs. **DLC**—The likelihood of interference with very-high-frequency networks in Alaska from stations operating on similar frequencies in other parts of the world, as a function of season, sunspot number, and time of day, is presented. This example serves as a model for similar computations for other communication links. Calculations are based upon regular reflection from the F2 layer, and data are supplied for estimating the probability of interference from sporadic-E reflections. *Subject Headings:* **1. Ionospheric radio wave reflection 2. Radio interference 3. Alaska.**—*Authors' abstract.*

6D–245 551.510.535:621.396

Hopkins, H. G. and Reynolds, L. G., **An experimental investigation of short-distance ionospheric propagation at low and very low frequencies.** *Institution of Electrical Engineers*, Pt. 3, 101(69):21–34, Jan. **1954.** 10 figs., 13 tables, 19 refs. **DWB**—The properties of the lower portion of the ionosphere have been studied at selected low and very low frequencies by observations of commercial continuous-wave transmitters located at distances of about 100 km from the receiving point. Attention has, in general, been confined to the horizontally-polarized electric component of the ionospheric wave received by means of a vertical loop set normal to the plane of propagation. Using mainly twin-channel recording equipment, an outline description of which is given, the pick-up on this loop has been compared in phase and magnitude with that on another vertical loop arranged in the plane of propagation. Changes in the apparent height and conversion coefficient of the reflecting layer have been studied, mainly at 16 and 70.8 kc/s, in terms of a simple model under both normal and disturbed conditions. The data serve generally to the measurements of other observers, but some discrepancies are discussed. It is considered that pulse-sounding technique has advantages over the continuous-wave method for ionospheric measurements in the frequency band under review, particularly at the higher frequencies. *Subject Headings:* **1. Ionospheric propagation 2. Radio wave propagation over short distances.**—*Authors' abstract.*

6D–246 551.510.535

Jackson, John E., **Measurements in the E-layer with the Navy Viking rocket.** *Journal of Geophysical Research*, 59(3):377–390, Sept. **1954.** 10 figs., 8 refs., 7 eqs. **MH-BH**—Two signals of frequencies at a ratio of 1 to 6 were transmitted from the rocket, which reached a peak altitude of

174 km. The highest altitude in which the Seddon experiment for the determination of the electron density was performed up to this time. For this purpose the indices of refraction were measured which decreased from about 1 at 90 km to 0.72 at 110 km (electron density 1.3×10^5 el/cc) and further to 0.61 at 165 km (density $1.8 > 10^5$ d/cc). Questionable data above this height show a rapid increase in the index. A value of 0.488 oersted was computed for the Earth's magnetic field at 139 km with an upper limit of 10^4 per second for the electron collision frequency. Factors affecting the results are analyzed, especially the role of the rocket. *Subject Headings:* **1. Ionospheric measurements 2. Rocket measurements 3. Electron density 4. Refractive index 5. White Sands Proving Ground, N. Mex.**—*A.A.*

6D–247 551.510.535:551.590.22

Johnson, M. H. (*Rad. Lab., Univ. of Calif.*), **The connection between lunar height changes and lunar currents in the E-layer.** *Journal of Geophysical Research*, 59(2):247–251, June **1954.** 4 refs., 15 eqs. **MH-BH**—The height changes produced by vertical electronic diffusion in the presence of negative ions are examined in some detail. Application of the results to the E layer shows that a previous qualitative discussion remains valid. *Subject Headings:* **1. Ionospheric currents 2. E layer 3. Lunar influences.**—*Author's abstract.*

6D–248 551.510.535

*Kelso, John M., **Group height calculations in the presence of the earth's magnetic field.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report, No. 58, March **1, 1954.** 31 p. 5 tables, 8 refs., 37 eqs. Also in: *Journal of Atmospheric and Terrestrial Physics*, 5(3):117–131, July **1954. DWB**—A method is given for the computation on an *h'-f* curve for an ionosphere of arbitrary shape. The effects of the earth's magnetic field may be included. The method is based on integral formulas involving the derivative of height with electron density, dz/dN, and misbehavior of this derivative curve leads to inaccuracies in the results. The two integral formulas used are obtained as special cases of the Gauss-Christoffel quadrature formula. The procedure is applied to: 1) a linear layer, 2) a parabolic layer, 3) a cosine layer and 4) an arc-cosine layer. The first three cases are studied with and without the earth's magnetic field, and the results of the first two are compared with exact calculations by other workers. The cosine layer results are compared with those for a Chapman layer. The arc-cosine layer shows a maximum in the *h'-f* curve which does not correspond to any prominent feature of the electron density curve, showing a need for care in the study of *h'-f* curves. A different method is given for the calculation of an *h'-f* curve in the case of penetration of a layer of arbitrary shape. *Subject Headings:* **1. Ionospheric height determination 2. Electron density.**—*Author's abstract.*

6D–249 551.510.535:551.501.83

Kimpara, Atsushi, **The sudden ionospheric disturbances on 22 November 1952.** *Nagoya. Univ. Research Institute of Atmospherics, Proceedings*, 2:40–52, Jan. **1954.** 11 figs., 5 tables. Append. p. 48. **DWB**—Despite the period of lower solar activity, a striking S.I.D. phenomenon was observed on Nov. 22, 1952, which revealed the close correlation of solar flare with outbursts of solar radio waves, Dellinger fadeout in short-wave communication, characteristic crochets in three components of magnetograms, fadeout of echoes in ionospheric measurements, and an abnormal increase of the intensity of atmospherics at very low frequencies. The author made a detailed study of these relations and found an advance increase of the intensity of atmospherics about an hour before the solar flare. He appends similar results obtained in a more active period (April, May 1952) as a reference, and discusses their characteristics and correlations. *Subject Headings:* **1. Sferics from ionosphere 2. Ionospheric disturbances 3. Solar radio noises.**—*Author's abstract.*

6D–250 551.510.535:551.557:551.594.5:538.56

Maxwell, A. and Dagg, M., **A radio astronomical investigation of drift movements in the upper atmosphere.** *Philosophical Magazine*, London, 45(365):551–569, June **1954.** 7 figs., 6 tables, refs. **DWB**—Records of fading of 3.7 m emissions from Cygnus and Cassiopeia at night on three receivers near Jodrell Bank showed irregularities in the diffracting screen at about 400 km height indicating steady translation. Average speed was 210 m/s, but ranged from 0–1000. Direction was nearly constant across magnetic lines of force, from W 19 h to midnight, changing rapidly to E or ESE 1–4 h. Movements are similar over a wide area, but in the F region in the auroral zone the average drift is 360 m/s and the direction less constant, from W–SW 9–21 h, equally from SW or from E–SE 21 h–6 h. A documented table of other evidence of F region motion is given for comparison. *Subject Headings:* **1. Ionospheric winds 2. Auroras.**—*C.E.P.B.*

6D–251 551.510.535:551.551:621.396

Maxwell, A., **Turbulence in the upper ionosphere.** *Philosophical Magazine*, Ser. 7, 45(371): 1247–1254, **Dec. 1954.** fig., table, 13 refs. **DWB**—Reynolds number in the 300–400 km level is

estimated as 300, at which value turbulent flow is probable. Owing to viscous damping the minimum wave-length of eddies is 2 km, decreasing downwards. Radio star fading due to irregular distribution of ionization is attributed to turbulence, inhibited during daylight by large temperature gradients, lower drift velocities or increased kinematic viscosity. Frequency of spread F echoes, amplitude of radio star fading and F region drift speed all show similar diurnal variation with minimum during daylight. It is suggested that ζ should be used for kinematic viscosity in the ionosphere. *Subject Headings:* **1. Ionospheric turbulence 2. Radio fading.**—*C.E.P.B.*

6D–252 551.510.535:551.590.24

Minnis, C. M., **The ionosphere during the solar eclipse of February 25, 1952.** *Nature*, London, 174(4442):1137–1138, Dec. 18, **1954.** 2 tables, 5 refs. **DWB**—Sources of E layer ionizing radiation and coronal 5303 A radiation at Khartoum and Ibadan are similar but not necessarily identical. An ionizing source in west limb has intrinsic brightness ≥ 30 times uniform disk radiation. Effective recombination coefficients E layer 1.51×10^{-8} cm^{-3} s^{-1} (125 km), F_1 8.2×10^{-9} (170 km). Changes of F2 layer were complex. A possible corpuscular eclipse effect in Es layer is discussed. *Subject Headings:* **1. Ionospheric variations 2. Eclipse phenomena.**—*C.E.P.B.*

6D–253 551.510.535:551.551:621.396.812

Minozuma, F. and Enomoto, H., **The mechanism and distribution of short period fading under conditions of ionospheric turbulence.** *Physical Society of London, Proceedings, Ser. B*, 67(3):211–216, March 1, **1954.** 6 figs., 7 refs., 12 eqs. **DWB**—Relations between distribution and rate of change of field intensity, and the turbulence which produces them are discussed and compared with transmissions from JJY Tokyo (4 and 8 Mc/s). The turbulence model in the ionosphere gives a turbulent diffusion coefficient $\lambda^2(Z) = \lambda^2_0 e^{-2Z/M}$. The mean square perturbation of atmospheric density derived from this expression predicts the fading speeds found in practice and may be a useful index for determining the safety fading factor. *Subject Headings:* **1. Ionospheric turbulence 2. Radio fading.**—*C.E.P.B.*

6D–254 551.510.535

Mitra, A. P., **Ionospheric ionization associated with sudden ionospheric disturbances.** Pennsylvania. State Univ. Ionosphere Research Laboratory. Contract AF 19(122)-44, Scientific Report No. 60, Dec. 15, **1954.** 60 p. 19 figs., 6 tables, 44 refs., 25 eqs. **MH-BH**—The basic problem of the nature, origin, and distribution of the excess ionization produced by the enhanced solar ultra-violet radiation during a flare is studied. For this purpose a concerted effort is made, for the first time, to correlate all the different ionospheric phenomena that are associated with the ultraviolet radiations of a solar flare, including the sudden geomagnetic effects. The reaction of the ionosphere to the transient stimulus of a flare is studied under non-equilibrium conditions and estimates made concerning the increase in the incoming photon flux of the ionizing radiation for flares of Class 1, Class 2, Class 3, and Class 3^+. These values are 6, 20, 50. and 90, respectively, and are equal to what would be obtained by multiplying the enhancement of the Hα intensities for the flares by the corresponding enhancements of the visible emission areas. Finally a tentative model of the flare ionization is given and its implications indicated. *Subject Headings:* **1. Ionospheric ionization 2. Ionospheric disturbances 3. Solar influences.**—*Author's abstract.*

6D–255 551.515.4:551.510.535

Mitra, S. K. and Kundu, M. R., **Thunderstorms and sporadic E ionization of the ionosphere.** *Nature*, London, 174(4434):798–799, Oct. 23, **1954.** 2 figs. **DWB**—During 10 thunder squalls (northwesters) in Bengal intense sporadic E ionization appeared with approach of storm, fEs reaching 10 Mc/s soon after highest gust and then decreasing gradually. *Subject Headings:* **1. Ionospheric storms 2. Northwesters.**—*C.E.P.B.*

6D–256 621.396.11:551.510.535

N.B.S. Research in radio propagation. *U. S. National Bureau of Standards, Technical News Bulletin*, 38(4):49–59, April **1954.** photos. **DLC**—A brief review of the work of the Central Radio Propagation Laboratory, which has four main divisions: (a) the Ionosphere Research Laboratory, whose investigations include solar rf radiation, upper atmospheric winds, etc; (b) the Systems Research Laboratory, which is concerned with tropospheric propagation and with research on the best use of the frequency spectrum; (c) the Measurements Standards Laboratory, which is responsible for the standard-frequency broadcasts from WWV and WWVH; (d) the propagation prediction services. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric research.**—*I.R.E., Proceedings, No. 3018, Nov. 1954.*

6D–257 551.501.89:551.594.51

Peterson, A. M. and Leadabrand, R. L. (*Radio Propagation Lab., Stanford Univ., Calif.*), **Long-range radio echoes from auroral ionization.** *Journal of Geophysical Research*, 59(2):306–309, June

1954. 2 figs. **DLC**—Radio echoes were observed at 1600 to 4700 km from Stanford Univ. (43.75°N) on frequencies of 6.42, 12.86 and 17.31 Mc at greater heights than heretofore reported, and with intensities exceeding strongest F layer propagated ground-scatter echoes occurring simultaneously. These echoes were first detected in Oct. 1952 during sporadic E layer studies, they are found in the F layer, not E layer zone as was presumed. Discrete and diffuse echo records are reproduced. Several layers may be present at varying distances. Diurnal and seasonal frequencies agree with auroral frequency data. *Subject Headings:* **1. Radio echoes from auroras 2. Stanford Univ., Calif.**—*M.R.*

6D–258 551.510.535:061.3

The physics of the ionosphere. *Nature*, London, 174(4436):866–868, Nov. 6, **1954. DWB**—Account of Physical Society conference at Cambridge, England, Sept. 6–9, 1954. Contributions summarized include D. F. MARTYN on movements in the F layer; D. K. BAILEY on forward scattering between 75 and 90 km; E. O. HULBERT on formation of ionized layers by X-rays; S. A. BOWHILL on irregularities and movements in ionosphere. There were several discussions of outstanding ionospheric problems. It was emphasized that radio methods measure movements of irregularities of electron density, which are not necessarily the same as air movements and should be termed "drifts" instead of "winds." *Subject Headings:* **1. Ionospheric conferences 2. Ionospheric movements. I. Physical Society of London.**—*C.E.P.B.*

6D–259 551.510.535:538.566

*Ramachandra Rao, B. and Bhagiratha Rao, E. (*Ionosphere Lab., Andhra Univ., Waltair*), **A continuous radio wave method of studying travelling disturbances in the ionosphere.** *Journal of Scientific and Industrial Research*, New Delhi, Sec. A, 13(10):462–466, Oct. **1954.** 2 figs., 2 tables, 7 refs. **DLC**—Different methods of determining ionospheric drift are reviewed, and the new method, which involves measurement of the time difference between passage of peculiar peaks on continuous ionospheric records, between one station and another nearby station with nearly the same frequency, described in detail and numerical examples cited and records presented by way of illustration. The stations cited are Calcutta, and Dacca, in 41 m. band. Data for May and June 1953 show movements ranging from 7 to 21 km/min, over a distance of 120 km. Reasons for assuming the drift to lie in the F rather than the E layer are given. Movements are usually toward the south (N-wind) but one case shows opposite drift. *Subject Headings:* **1. Ionospheric wind measurement techniques 2. F layer drift 3. Calcutta, India.**—*M.R.*

6D–260 551.510.535

Rangarajan, S. (*Kodaikanal Obs., Kodaikanal, India*), **The sporadic E layer at Kodaikanal.** *Journal of Geophysical Research*, 59(2):239–246, June **1954.** 3 figs., 2 tables, 9 refs. **MH-BH**—An examination of the ionospheric records at Kodaikanal, which is located almost on the geomagnetic equator, reveals that the sporadic E layer here has some regular features not observed at other latitudes. It occurs in nearly 93 per cent of the half-hourly records during the daytime. Two main types of Es are observed; namely, (1) the patchy type with a well-marked diurnal variation, and (2) the blanketing type which occurs mostly during afternoons. It is found that neither meteoric activity nor thunderstorm activity has any appreciable influence on the formation of either of the two types of Es. No correlation is observed between Es and the geomagnetic field. *Subject Headings:* **1. Sporadic E layer 2. Kodaikanal, India.**—*Author's abstract.*

6D–261 551.510.535

Reber, Grote (*Wailuku, Maui, Territory of Hawaii*), **Spread F over Hawaii.** *Journal of Geophysical Research*, 59(2):257–265, June **1954.** 5 figs. **MH-BH**—The random variations of intensity of signals from point sources caused by the ionosphere greatly affect studies of cosmic static. One cause of these fluctuations is the condition known as spread F, which indicates the presence of diffuse and irregular echoes from the F region of the ionosphere. Analyses of spread F over Hawaii were completed for the period 1944–1953. The diurnal and seasonal properties are discussed, and a conclusion is reached regarding latitude and longitude effects. Some properties of scintillations at decameter waves are described. *Subject Headings:* **1. Spread F 2. F region 3. Ionospheric echoes 4. Hawaii.**—*Author's abstract.*

6D–262 551.510.535

Reber, Grote (*Hawaii*), **Spread F over Washington.** *Journal of Geophysical Research*, 59(4): 445–448, Dec. **1954.** 2 figs. **MH-BH**—Continuing work of author on spread F over Hawaii (6D–261), the data (foF2 published by CRPL) for Washington (1944–53) and unpublished data for Baton Rouge (1944, 1948 and 1952), Winnipeg (1948 and 1952), San Francisco, Rarotonga, Christchurch and Watheroo for 1952 are analyzed to show the diurnal variations in summer, winter and at the equinoxes. In general the spread F is greater in winter than in summer and in some

winters it is more frequent than in others. Shape of curve and intensity varies from place to place. Values at the equinoxes are usually between winter and summer values. The onset of the phenomenon is irregular and gradual; the maximum occurs between 2 and 40 m and the decrease is usually abrupt. *Subject Headings:* **1. Spread F variations 2. Ionospheric variations 3. Washington, D. C.**—*M.R.*

6D–263 621.396.8:551.510.535

Sacco, L., **La distribuzione statistica della intensità dei segnali radio propogati nella troposfera e nella ionosfera.** [The statistical distribution of field strength of radio signals propagated in the troposphere and the ionosphere.] *Poste e Telecommunicazioni*, Rome, 22(2):55–72, Feb. **1954.** 4 figs., 21 refs., 56 eqs. **DLC**—An examination is made of the types of distribution in time which best represent the fluctuations of radio signals traversing the troposphere and the ionosphere. The distributions considered are (a) normal, (b) log normal, (c) fluctuations due to interference (Rayleigh distribution), and (d) fluctuations due to polarization variations. Gamma and phase distribution are discussed and the concept of correlation is introduced. *Subject Heading:* **1. Radio wave propagation.**—*I.R.E., Proceedings, No. 3020, Nov. 1954.*

6D–264 551.510.535

Schrag, R. L., **Extended range ionospheric observations at 150 Kc/s.** Pennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(122)-44, Scientific Report No. 66, July 15, **1954.** 137 p. 49 figs., 7 tables, 16 refs. **MH-BH**—Results of low frequency pulsed radio sounding experiments employing extended-range receiving instrumentation are discussed. The experiments were conducted with 150 Kc/s vertically incident waves, and involved amplitude and polarization studies of multiple-hop echo systems. Nighttime observations have revealed two phenomena of interest: (1) Multiple-hop amplitude decay patterns for normal E-region echoes during low absorption conditions indicate a nearly continual roughness of the reflecting surface. On occasion these patterns exhibit pronounced focusing, indicating that ionospheric reflections are taking place from concave "surfaces." Effects of such large-scale irregularities in the surfaces of constant N are not visible in first-hop echo observations. The focusing results are summarized, and estimates are presented concerning the nature and sizes of the E-region irregularities involved. (2) Occasionally, trains of weak echoes are detected having, principally, extraordinary polarization and very low successive-hop attenuation. Their amplitudes and delays are found to be consistent with a highly efficient M-type reflection mechanism utilizing reflecting boundaries at approximately 130 and 240 km. The lower boundary, being partially transparent, is interpreted as a sporadic-E ionization slab; while the upper reflector is believed to result from a deep ionization "well" between Regions E and F. It is concluded that the nighttime electron density at 240 km may, on occasion, fall to a value less than 312 elec./cc. *Subject Headings:* **1. Ionospheric reflection 2. Boundaries of the ionosphere.**—*Author's abstract.*

6D–265 551.510.535:551.507.362

*Seddon, J. Carl, **Rocket investigations of the ionosphere by radio propagation method.** *U. S. Naval Research Laboratory, Upper Atmosphere Research Report*, No. 22; *NRL Report* 4304, March 1, **1954.** 37 p. figs., tables, 9 refs., eqs. **DWB**—Daytime measurements of electron density, ion density, electron collision frequency, mean molecular cross section, and earth's magnetic field during V-2 rocket flights at the White Sands Proving Ground, New Mexico, were obtained on March 7, 1947, January 22, 1948, and September 29, 1949. In each case a 4.274-Mc signal and its 6th harmonic were radiated from the rocket to receiving stations on the ground to obtain measurements of the ordinary and extraordinary indices of refraction of the region around the rocket. The results of one flight show an ion layer with a maximum of 5×10^5 ions/cc and a small electron layer with a maximum of 7500 el./cc just below the E1-layer. On a September day the E1-layer remained dense up to the E2-layer, while on a January day the density apparently decreased above the E1-layer maximum to much lower values. It is shown that the Lorentz polarization term should not be used in E layer computations at 4 Mc. A detailed explanation of the data analysis methods is included in the appendixes. Extensive calculations using the general Appleton-Hartree formula have been made at 4.274 Mc and some of the results are shown for various collision frequencies, using the value of the magnetic field at 100 km above the White Sands Proving Ground, New Mexico. *Subject Headings:* **1. Rocket investigations 2. Ionospheric refraction 3. Radio wave propagation 4. White Sands Proving Ground, N. Mex.**—*Author's abstract.*

6D–266 551.510.535:621.396.11

Silberstein, R., **Sweep frequency backscatter: some observations and deductions.** *Institute of Radio Engineers, New York, Transactions*, vol. AP-2(2):56–63, April **1954.** 12 figs., table, 10 refs. **DLC**—Detailed analysis of records taken during two periods in December 1952 and January 1953. "In one group of observations over a 1150-km path on three undisturbed days, the values of F-2

layer maximum usable frequency scaled from midpoint vertical-incidence ionospheric records and those determined by backscatter delay assuming ground scatter agree almost within experimental error. In another three-day group characterized by a low-latitude ionospheric disturbance with low geomagnetic K indexes but considerable sporadic E activity, values of MUF determined from scatter were much too high under the ground-scatter assumption, errors of about 30 percent being not uncommon." The distant scatter in this case appears to originate at the E layer. *Subject Headings:* **1. Ionospheric records 2. Ionospheric disturbances.**—*Author's abstract.*

6D–267 551.510.535:621.396

Singh, R. N., **Ionosphere and nature of fading patterns of received radio signals.** *Indian Journal of Physics*, Calcutta, 28(3):109–118, March **1954.** 12 figs., 8 refs. **DLC**—Records of reception of sw transmissions from Indian and other stations are analyzed and compared with theoretical curves derived from Rayleigh's probability formula. A study is made of (a) variations of the nature of fading with time of day for a given signal frequency and transmitter distance, and (b) variation of the nature of fading with transmission distance for a given frequency at different times of day. The results indicate that the fading pattern is at least partially determined by the electron density in the region of the ionosphere at which the received waves are reflected. *Subject Headings:* **1. Radio fading 2. Electron density.**—*Author's abstract.*

6D–268 551.510.535

Skinner, N. J. and Wright, R. W., **F2-layer regularities at Ibadan.** *Journal of Atmospheric and Terrestrial Physics*, 5(5–6):290–297, Nov. **1954.** 5 figs., table, 9 refs., 6 eqs. **DWB**—Ibadan, Nigeria, is a typical equatorial station. Diurnal variation of total electron content n below height of maximum ionization h_m and mean values of maximum electron density N_m of F2 layer are presented as curves for months Dec. 1951–Jan. 1953, showing that n is more regular than N_m. Method of calculating n is discussed. Coefficient of recombination and rate of ion production are calculated from diurnal variation of n. The sunset minimum in virtual height of F2 is considered to be spurious. *Subject Headings:* **1. F2 layer 2. Ibadan, Nigeria.**—*C.E.P.B.*

6D–269 551.510.535:621.396

Watts, J. M. and Brown, J. N., **Some results of sweep-frequency investigation in the low frequency band.** *Journal of Geophysical Research*, Washington, D. C., 59(1):71–86, March **1954.** 13 figs., 10 refs. **MH-BH**—Sweep-frequency techniques, long in use in high-frequency ionospheric research, have been used recently in low frequency research at the U. S. National Bureau of Standards. The discovery of a nighttime layer between the E and F layers, which is erratic in appearance, but which seems to have continuity with the daytime E layer during sunset, is announced. Trace characteristic of magneto-ionic splitting are exhibited for the new layer and also for the low-level E layer. Polarization and virtual height records of F layer at night are shown and the effects of ionosphere storms on E and F regions are demonstrated. Daytime reflections have been recorded from three distinct E region boundaries, each of which appears to be quite sharp in ion gradient. These extend from about 70 km to over 100 km in virtual height. Several recordings of turbulent conditions in the lower levels of the daytime E region are shown. *Subject Headings:* **1. Ionospheric radio wave reflection 2. Ionospheric research 3. E layer 4. F layers.**—*Authors' abstract.*

6D–270 551.510.535:551.594.7

Wells, H. W. (*Carnegie Inst. of Wash., Wash., D. C.*), **F-scatter at Huancayo, Peru, and relation to radio star scintillations.** *Journal of Geophysical Research*, 59(2):273–277, June **1954.** 2 figs., 6 refs. **MH-BH**—The scattering of radio waves by the F region of the ionosphere at an equatorial location (Huancayo, Peru) was discussed by Booker and Wells (1938). Subsequent analysis reveals pronouncedly diurnal, seasonal, and annual characteristics. It is fundamentally a nighttime event, with greatest frequency of occurrence in the period from four hours before midnight to four hours after midnight. The scattering is most prevalent during seasons when the sun is overhead and is infrequently observed during May, June, July, and August (local winter) when the noon solar zenith angle becomes as great as 35°. The relative total annual occurrence of F region scatter for the period 1938 through 1945 shows low values during 1941–1942, followed by a rapid increase through 1946, which is not closely related to solar activity. The diurnal properties of F scatter closely correspond to reported characteristics of radio star scintillations with peak activity around midnight. However, the annual or seasonal properties are not in simple agreement. *Subject Headings:* **1. F layer scattering 2. Radio wave propagation 3. Scintillation 4. Huancayo, Peru.**—*Author's abstract.*

6D–271 551.510.535:551.557

Wormell, T. W., **Winds at ionospheric levels—a survey of recent British work. Summary.** (In: American Meteorological Society and Royal Meteorological Society, **Proceedings of the Toronto**

Meteorological Conference, Sept. 9–15, 1953, pub. **1954.** p. 33–34.) **DWB**—Various radio methods give velocities of 25–200 m/s, mostly near 80 m/s, higher in winter than summer and higher in F (sometimes >200 m/s) than E layer. Diurnal and seasonal variations are summarized. *Subject Heading:* **1. Ionospheric winds.**—*C.E.P.B.*

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6D–272 551.594.7:551.510.535

Appleton, Sir Edward and Beynon, W. J. G., **An ionospheric attenuation equivalence theorem.** *Journal of Atmospheric and Terrestrial Physics*, 6(2/3):141–148, March **1955.** 2 figs., 6 refs., 21 eqs. **DWB**—The phenomenon of radio-wave attenuation by way of ionospheric partial reflections and scattering is examined theoretically, and an equivalence theorem, relating oblique incidence to vertical-incidence phenomena, is derived. For radio frequencies well in excess of the equivalent critical frequency of the medium this may be written

$$[\rho]_{i_0}{}^f = \lambda\,[\rho]_0{}^{f\cos i_0}$$

where ρ is the fractional attenuation, f is the frequency, and i_0 the angle of incidence in the oblique-incidence case. Where the radio-wave electric vector is at right angles to the plane of propagation, λ is unity; when the electric vector lies in the plane of propagation, λ is equal to the usual obliquity factor $\cos 2i_0$. *Subject Headings:* **1. Radio wave attenuation 2. Ionospheric reflection.**—*Authors' abstract.*

6D–273 551.510.535:551.594.6:550.385

Appleton, Sir Edward, **Storms in the ionosphere.** *Endeavour*, London, 14(53):24–28, Jan. **1955.** 3 figs., 8 refs., 5 eqs. **DLC**—The author describes (1) the experimental radio-sounding of the ionosphere for ionospheric forecasting giving the equations for the conditions of reflection at vertical incidence for the ordinary case and for the extraordinary case; (2) the characteristics of the E and F layers; (3) behavior of ionosphere layers at high latitudes; (4) the characteristics of ionospheric stormy conditions in equatorial regions; (5) the variation of electron density at noon in the E, F, and F2 layers; (6) the practical implications of storm changes in the F2 layer in relation to radio circuits and (7) the possible physical mechanisms of ionospheric storms. *Subject Headings:* **1. Ionospheric storms 2. Ionospheric reflection 3. Ionospheric layers.**—*I.L.D.*

6D–274 551.510.535:551.557

Banerji, R. B., **The autocorrelogram of randomly fading waves.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):50–56, Jan. **1955.** 3 figs., 6 refs., eqs. **DWB**—The autocorrelograms of fading patterns from rough ionospheres characterized by pure drift and pure turbulence are calculated and that from a combination of the two is deduced. The reality of oscillations in the tail of the correlogram, and hence the distinction between the two types, can be established if more than 220 points are available. A correlogram obtained by R. W. E. McNicol (1949), which resembles the theoretical one for a drifting ionosphere, is regarded as real. *Subject Heading:* **1. Ionospheric winds.** —*C.E.P.B.*

6D–275 551.510.535

Baral, S. S., **Studies on the sunrise effect in regions E and F.** *Journal of Atmospheric and Terrestrial Physics*, 6(2/3):160–170, March **1955.** 3 figs., 6 tables, 13 refs. **DWB**—The characteristics of an ionospheric layer are known to undergo variations during sunrise in the layer (sunrise-effect). The sunrise-effect begins not when the solar rays first strike the layer, but later. This delay phenomenon in the "sunrise-effect" has been studied for the E and F regions of the ionosphere at Calcutta during the period January 1947 to June 1952. It is shown that the observed delay times can be explained as due to the difference between the nighttime and daytime heights of an ionospheric layer. The early-morning rays which strike the night side of the ionospheric layer and increase its ionization, must pass above the daytime height of the layer, in order that the active wavelengths do not get absorbed by the thickness of the air through which the rays pass. The measured daytime height of the layer (after the occurrence of the sunrise-effect) agrees reasonably well with the height grazing which the solar rays strike the nighttime height of the layer at the time of commencement of the sunrise-effect. *Subject Headings:* **1. Ionospheric variations 2. Calcutta, India.**—*Author's abstract.*

6D–276 551.510.535:001.4

Bibl, K.; Busch, R.; Rawer, K. and Suchy, K., **La nomenclature ionosphérique et les conventions pour le dépouillement.** [Ionospheric nomenclature and conventions for evaluation.] *Journal of Atmospheric and Terrestrial Physics*, 6(2/3):69–87, March **1955.** 7 figs., 22 refs., 7 eqs. English summary p. 69. **DWB**—Proposals are made for classifying ionospheric "regions" and "layers."

F region may be divided into F_1, F_2, an intermediate layer $F_{1.5}$ which sometimes occurs in tropics, and transitory layers. E region is divided into E, E_s and I ($=E_2+E_3$). Definitions are given of f_{min}, occultation frequency f_a, critical frequency f_c and top frequency f_t. Author also discusses very thin layers, magneto-ionic components and virtual height. Annexes deal with intensity of echoes, influence of transmitter characteristics, ionosphere characteristics and give a list of descriptive symbols. *Subject Headings:* **1. Ionospheric structure 2. Ionospheric classification.**—*C.E.P.B.*

6D–277 551.510.535:621.396.11

†Bray, W. J.; Hopkins, H. G.; Kitchen, F. A. and Saxton, J. A., **Review of long-distance of radio-wave propagation above 30 Mc/s.** *Institution of Electrical Engineers, London, Proceedings*, Pt. B, 102(1):87–95, Jan. **1955.** 3 tables, 61 refs. **DLC**—The purpose of the paper is to summarize the present state of knowledge concerning the factors affecting long-distance radio wave propagation at frequencies above 30 Mc/s. Attention is drawn to various ionospheric and tropospheric propagation mechanisms and their broad characteristics. The account of these special processes is preceded by Sections dealing with selected aspects of "normal" propagation. A comprehensive bibliography is included. *Subject Headings:* **1. Radio wave propagation 2. Ionospheric propagation 3. Ionospheric characteristics.**—*Authors' abstract.*

6D–278 551.510.535:550.385

Davies, Kenneth and Hagg, E. L., **Ionospheric absorption measurements at Prince Rupert.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):18–32, Jan. **1955.** 10 figs., table, 12 refs., 7 eqs. **DWB**—Observations in 1949–50 on 20 Mc in 54.3°N, 130.3°W, near the auroral zone are discussed. Noon values of absorption show little dependence on solar zenith angle χ but are abnormally high in winter. Diurnal variation of $-\log \rho$ is represented roughly by $B\ (\cos \chi)^n$ where B varies from 9 to 35 and n from 0.82 to 0.29 in individual months; mean values 20 and 0.5. Value of $-\log \rho$ increases linearly with 3-hour magnetic index K when K is above 4; mean correlation 0.59. There is a less close relation (0.31) with sporadic E ionization. After discussion of these results it is concluded that near the auroral zone ionization by UV radiation is modified by the influence of charged corpuscles. *Subject Headings:* **1. Ionospheric absorption 2. Magnetic index 3. Prince Rupert, Columbia.**—*C.E.P.B.*

6D–279 551.594.7:551.510.535

Gerson, N. C., **Sporadic E propagation.** *Journal of Atmospheric and Terrestrial Physics*, 6(2/3): 113–116, March **1955.** fig. **DWB**—Observations in N. America mostly in summer of long range communication on 50 Mc/s due to Es reflection showed most frequent station separation around 1500 km. Results are analyzed into single hop, double hop (one cloud, peak about 1800 km) and a few double hop (2 clouds). Es cloud diameter is 600–1250 km (mean 925 km) E–W, probably more N–S. Possibility of 50 Mc/s communication up to 7000 km is discussed. *Subject Headings:* **1. Ionospheric reflection 2. North America.**—*C.E.P.B.*

6D–280 551.510.535

†Jones, Robert E., **The development of an E-region model consistent with long wave phase path measurements.** *Journal of Atmospheric and Terrestrial Physics*, 6(1):1–17, Jan. **1955.** 10 figs., 2 tables, 32 refs., 9 eqs. **DWB**—Diurnal changes in phase height of 150 kc radio signals reflected from lower E region, observed in Pennsylvania, are plotted. Mean range is 15 km in summer, 15.5 at equinoxes and 11.5 in winter. Several new ionosphere models are discussed, starting with CHAPMAN's (1931) and incorporating effects of variable scale height, dissociation of O_2 and variable recombination. That finally chosen (fig. 6, moderately sharp on the lower side) is the best compromise but is not entirely satisfactory because of the uncertainties involved. *Subject Headings:* **1. E layer 2. Ionospheric variations 3. Pennsylvania.**—*C.E.P.B.*

6D–281 551.510.535

Littlewood, C. A. and Chapman, J. H., **A measurement at Ottawa of the change in height with lunar time of the E region of the ionosphere.** *Canadian Journal of Physics*, Ottawa, 33(1):11–16, Jan. **1955.** 2 figs., 7 refs. **DWB**—The method used by APPLETON and WEEKES to detect the lunar variation of height of the E region of the ionosphere has been used to determine the amplitude and phase of the lunar height variation at Ottawa. Observations were made from October to December, 1952. A sinusoidal variation of height of 1.5 km. amplitude and 15 hr period was observed. The maximum height occurred about six hours after lunar transit. This result differs in phase by six hours from that observed in Cambridge in 1938. *Subject Headings:* **1. Lunar height variation 2. E region 3. Ottawa, Canada.**—*Authors' abstract.*

6D–282 551.510.535:551.590.24

Minnis, C. M., **Ionospheric behaviour at Khartoum during the eclipse of 25th February 1952.** *Journal of Atmospheric and Terrestrial Physics*, 6(2/3):91–112, March **1955.** 14 figs., 3 tables, 17

refs., 10 eqs. **DWB**—Automatic *h'f* records were made at intervals of 4½ minutes during the eclipse and at quarter-hour intervals on ten control days. The behavior of both *E*- and F_1-layers can be explained in terms of Chapman layers having constant effective recombination coefficients ($\alpha' E = 1.5 \times 10^{-8}$ cm^3 s^{-1}, $\alpha' F_1 = 8 \times 10^{-9}$ cm^3 s^{-1}), and assuming a non-uniform distribution of the sources of ionizing radiation on the sun's disc. It has been possible to derive the positions and relative intensities of these sources from the *E*-layer data, and they appear to be related to the location of sources of intense green coronal radiation. The F_2-layer response to the eclipse is consistent with the assumption of two component layers: a lower one, corresponding to the normal post-sunrise F_2-layer, which is sensitive to changes in solar radiation and has a high α', and an upper one which is a later development of the lower layer but which is insensitive to solar radiation and has a small α'. Changes in the absorption in *D*-layer confirm the asymmetrical distribution of sources of ionizing radiation. Although *fEs* showed a very deep minimum about an hour after totality, there is nothing to suggest that this was an eclipse effect, nor is there any evidence for a corpuscular eclipse in F_2-layer about two hours before the optical eclipse. Shorter version appeared in: International Council of Scientific Unions. Mixed Commission on the Ionosphere, Canberra, Australia, Aug. 24–26, 1952, **Proceedings,** pub. **1953.** p. 38–42. 2 eqs. **DWB.** *Subject Headings:* **1. Ionospheric variations 2. Eclipse phenomena.**—*Author's abstract.*

6D–283 551.557:551.510.535

Osborne, B. W., **Horizontal movements of ionization in the equatorial F-region.** *Journal of Atmospheric and Terrestrial Physics,* 6(2/3):117–123, March **1955.** 3 figs., 14 refs. **DWB**—Spaced-aerial observations of horizontal velocity of ionized particles during day in F region at Singapore gave in Sept.–Oct. 1953 a regular semidiurnal variation from about 52 m/s towards E at 9–12 h LMT to nearly 50 m/s towards W at 15–17 h. A doubtful tendency was found for movement to S at 9–15 h. In Nov. 1953–Feb. 1954 movements were less regular and mostly towards W from 10–18 h. In March–April 1954 variation was from 40–50 m/s towards E at 9 h and 23 h to over 50 m/s towards W at 17 h. *Subject Headings:* **1. Ionospheric drift 2. Singapore.**—*C.E.P.B.*

6D–284 551.508.96

Phillips, G. J., **An apparatus for recording time-delays between radio fading chracteristics.** *Journal of Atmospheric and Terrestrial Physics,* 6(2/3):124–128, March **1955.** 4 figs., ref. **DWB**—When amplitudes from two aerials pass in succession through minimum values a condenser is given a charge proportional to the time between occurrences of the 2 minima. It is discharged through a center-pen recorder, polarity depending on the sense of the time delay and length of spike on the interval. Circuits are shown and practical details noted. *Subject Heading:* **1. Ionospheric recorders.**—*C.E.P.B.*

6D–285 551.510.535 551.557 551.593.653

Royal Meteorological Society, **Symposium on the Upper Atmosphere. Opening address by Sir Edward Appleton.** *Royal Meteorological Society, Quarterly Journal,* 81(347):102–107, Jan. **1955. DWB**—Summaries of the papers are given with reports of discussions. In the opening address Appleton surveyed present state of knowledge, world morphology of E and F2 layers and recombination coefficient. Other papers were: Browne, I. C., **The meteor trails,** 3 refs.; Palmer, H. P., **The scintillation of radio stars,** 2 refs.; Johnson, D. H., **Tidal oscillations of the lower stratosphere** (abs. separately); McIntosh, D. H., **Upper winds from geomagnetic observations;** Jarrett, A. H., **The possibilities of multilayer coatings for auroral research;** Paton, J., **Noctilucent clouds.** *Subject Headings:* **1. Ionosphere research 2. Noctilucent clouds 3. Winds in stratosphere. I. Appleton, Sir Edward.**—*C.E.P.B.*

6D–286 550.384:550.37:551.510.535

Scholte, J. G. and Veldkamp, J., **Geomagnetic and geoelectric variations.** *Journal of Atmospheric and Terrestrial Physics,* 6(1):33–45, Jan. **1955.** 10 figs., 14 refs., 6 eqs. **DWB**—Relations between nearly harmonic N–S geomagnetic fluctuations (period about 45 sec by day, 110 sec by night) at magnetic observatories and the E–W geoelectric current at Witteveen are discussed with examples. The source of the fluctuations is found in ionospheric vibrations. Results are compared with theoretical formulas for electromagnetic waves inside and outside a sphere. The (small) phase difference between the electric and magnetic fluctuations can be expressed as a function of the depth of the conducting layer of the earth, but the results do not agree with the geological structure at Witteveen. *Subject Headings:* **1. Magnetic disturbances 2. Geoelectric disturbances 3. Ionospheric variations.**—*C.E.P.B.*

6D–287 551.510.535

Whale, H. A., **Widespread diurnal variations of effective slope of the ionosphere.** *Nature,* London, 175(4445):77–78, Jan. 8, **1955.** fig., ref., eq. **DWB**—Bearing and elevation of radio

signals from Fiji and Brisbane, received at Seagrave, Auckland, are used to determine daytime diurnal variation of the effective N–S and E–W slopes of the ionosphere. *Subject Heading:* **1. Ionospheric slope.**—*C.E.P.B.*

6D–288 621.39(05):016

†**Archiv der Elektrischen Übertragung,** Stuttgart, v. 1, July/Aug. **1947**–. Latest issue seen, 8(7), June **1954.** Monthly. Irreg. Price: DM 15,50 per quarter. Editor, 1954, Karl W. Wagner. Printer, S. Hirzal Verlag. **DLC**—This high quality monthly journal contains theoretical and practical articles in all fields of radio, radar and TV technology, and in addition reviews of books and bibliographic citations (2 pages per month). A number of articles on ionospheric and tropospheric propagation, sferics and meteor or radio astronomy can be found in each volume indexed under the heading Ausbreitung electromagnetischer Wellen. Not all articles are in German. For instance in Vol. 7 there is an article in English by APPLETON on Ionospheric storms. *Subject Headings:* **1. Telecommunication 2. Ionosphere bibliographies 3. Serial publications.**—*M.R.*

6D–289 551.5(05)

Australian Journal of Physics, Melbourne, v. 1, Feb. **1948**–. Latest issue seen, 7(4), Dec. 1954. v. 1–5 as **Australian Journal of Scientific Research, Series A, Physical Sciences.** Quarterly. Price: 30/-per year. Publ. by Australia. Commonwealth Scientific and Industrial Research Organization, in collaboration with Australian Branch of Institute of Physics, and with Australian National Research Council. **DLC**—Each issue contains from 10 to 20 papers on meteorology, astronomy, chemistry and other physical sciences as well as short communications. Each volume contains an alphabetical author-subject index. *Subject Heading:* **1. Periodicals.**—*M.L.R.*

6D–290 551.510.535(05)

Japan. Science Council. Ionosphere Research Committee, **Report of Ionosphere Research in Japan.** First issue seen. v. 3, no. 1/2, **1949**—Latest issue seen, v. 8, no. 1, Oct. **1954. DWB, DLC**—(Holdings incompl.) Each issue contains a few substantial papers dealing with ionospheric cosmic-ray distribution, radio-wave propagation, magnetic storms, night-sky light measurements, electric conductivity of the ionosphere, etc. In the late issues (after 1950) the articles are in English; in the earlier ones they are in Japanese with English summaries. Most papers contain tabular and graphical data and mathematical analyses. Several of the papers appear in this bibliography under separate entries (*see items* 6D-74, –78, –108, –143, –144, –150, etc.); others will be found elsewhere in Meteorological Abstracts and Bibliography. *Subject Headings:* **1. Ionospheric research 2. Serial publications.**—*G.T.*

6D–291 (05):551.510.535:016

Journal of Scientific and Industrial Research, New Delhi, v. 1, Oct. **1942**–. Latest issue seen, v. 14, no. 1, Jan. 1955. Monthly. In two sections, **Sec. A** and **Sec. B,** in same binding, separate title-pages, separate pagination (continuous for each section). Price: rs. 15 (inland); 30 sh. (foreign), per year. **DLC**—Each issue contains original contributions (usually several on some aspects of the ionosphere) book reviews, notes and news, bibliographical lists of papers published in some Indian scientific periodicals, progress reports, Indian patents and letters to the editor. Of particular interest is the section devoted to monthly ionospheric data for Calcutta and Ahmedabad containing tables and graphs. *Subject Headings:* **1. Ionospheric data 2. Calcutta, India 3. Ahmedabad, India.**—*M.L.R.*

6D–292 551.510.535:019.941 621.396(05)

Wireless Engineer, London, v. 1, Oct. **1923**–. Latest issue seen, 31(12), Dec. **1954.** Monthly. Subtitle: **A Journal of Radio Research and Progress.** Editor, W. T. Cocking. Price: Home and overseas, 27 s. od; Canada and U. S., $7.50. **DLC**—Each issue contains abstracts of current literature arranged according to subject. For material on radio wave propagation consult section on Propagation of Waves. Abstracts are classified according to the Universal Decimal Classification system. Original papers and book reviews are also included. *Subject Headings:* **1. Radio wave propagation abstracts 2. Radio engineering 3. Serial publications.**—*M.L.R.*

6D–293 551.510.535(05):016

†**Zhurnal Tekhnicheskoĭ Fiziki,** Moscow, v. 1, **1931**–. Latest issue seen, v. 25, no. 1, Jan. 1955. Issued by Akademiia Nauk SSSR. Monthly. Price: 12 rub. per issue; 180 rub. per year. Supersedes **Zhurnal Prikladnoĭ Fiziki,** 1924–1930. At head of title: **Fizicheskiĭ Zhurnal, Seriia 5. DLC**—In each issue there is an extensive bibliography. Section 10a—on radiophysics—gives 15 or 20 references (each month) to literature on the ionosphere and ionospheric propagation from both native and foreign journals. *Subject Headings:* **1. Bibliography on ionospheric propagation 2. Russian literature 3. Periodical accession lists. I. Akademiia Nauk SSSR.**—*M.R.*

SUPPLEMENTARY MATERIAL

6D–294 551.510.535

Hess, Victor F., **Die Ionisierungsbilanz der Atmosphäre.** [The ionization balance of the atmosphere.] *Ergebnisse der Kosmischen Physik*, Leipzig, 2:95–152, **1933.** 2 figs., tables, 112 refs. **DLC**—Opens with a comprehensive review of the discoveries relating to the various ionization processes in the atmosphere and the methods by which the number of ions is decreased. Then considers a number of ionization processes. Next (p. 144–149) examines the ionic balance in the atmosphere over land and sea and in the free atmosphere to the upper limits of the troposphere and also ionic relations in the stratosphere. Concludes that direct comparison of observed and calculated ionizations values for lower and upper stratosphere are not yet possible. *Subject Headings:* **1. Ionization balance 2. Ionosphere.**—*From Physics Abstracts, No. 1062, 1934.*

6D–295 551.510.535

Matsushita, Sadami (*Geophysical Inst., Kyoto Univ.*), **On the sporadic-E.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere in Japan*, 7(2):72–73, June **1953.** fig., table. **DWB**—The author discusses intense sporadic E near the magnetic equator and the effective recombination coefficients of the Es. *Subject Heading:* **1. Sporadic E layer.**—*I.L.D.*

6D–296 551.510.535:551.594.7:621.396.029.6

Newton, R. G. and Rogers, T. F., **Dependence of total microwave atmospheric absorption on propagation path elevation.** *U. S. Air Force. Cambridge Research Center, AFCRC Technical Report*, 53-54A, Nov. **1953.** 56 p. 2 figs., 15 refs., 86 eqs. **DLC**—For microwave propagation paths extending appreciably into the troposphere or stratosphere, the attenuation due to atmospheric gaseous absorption cannot be calculated simply, since it cannot be assumed that the ground level gaseous content and temperature—and consequently the absorption coefficient—remain constant over the path length. Assuming that the absolute and partial pressures decrease exponentially with altitude and that the temperature decrease is linear, the Van Vleck-Weiskopf-Lorenz equation for a collision-broadened microwave absorption line leads to an integral for total path absorption loss that cannot be evaluated in closed form. An approximate value of the absorption is obtained, therefore, in which the approximation error can be made arbitrarily small; terms are explicitly calculated to about 1% error for cases of interest. The pertinent equations are summarized for ease of application, and a few examples are calculated. *Subject Headings:* **1. Microwave propagation 2. Atmospheric absorption.**—*Authors' abstract.*

6D–297 551.510.535:551.594.7(02)

†Rawer, Karl, **Die Ionosphäre. Ihre Bedeutung für Geophysik und Radioverkehr.** [The ionosphere. Its importance in geophysics and radio communication.] Groningen, P. Noordhoff, **1953.** 179 p. 67 figs., 143 refs., 68 eqs. **DLC**—A complete text on the use of radio in ionospheric research. Ch. I takes up methods of observation by echoes, spectroscopic methods for aurora and airglow, magnetic, meteor and luminous night clouds, and soundings; Ch. II gives results of observations by echo methods, magnetic data, composition, pressure, density and temperature. Ch. III discusses theories of ionospheric stratification (origin and disappearance of ionization and explanation of different layers. Ch. IV takes up normal and irregular changes of the ionosphere (D, E, F2, F, E2, G and E_s and influence of magnetic storms, eclipses, polar summer and night, commencements). Ch. V discusses influence of ionosphere on propagation of radiowaves and forecasting propagation. *Subject Headings:* **1. Ionosphere 2. Ionospheric propagation 3. Textbooks.**—*M.R.*

6D–298 551.510.5:538.3

Wells, W. B., **Upper atmosphere studies by means of low-frequency electromagnetic waves** U. S. Navy. Electronics Laboratory, San Diego, Calif., Report 311, Dec. 9, **1953.** 72 p. 32 figs. 2 tables. **DWB**—Electromagnetic measurements were conducted on two consecutive days of each month from April 1950 through February 1951, except May and November, to study the propagation properties of the upper atmosphere. The receiving site was located near Gila Bend, Arizona. Photographic records of oscilloscope traces (A-scan) were taken of signals from distant lightning discharges (sferics) and of echoes from pulse soundings on 196 kc at vertical incidence. Sferics (of frequencies between approximately 5 and 20 kc) at oblique incidence are refracted from heights of 82 to 92 km at night. Pulse soundings at vertical incidence, on a frequency of 196 kc, indicated average nighttime virtual heights of reflection between 76 and 120 km. No significant correlation was found between the data obtained on the electromagnetic studies and those on acoustic studies conducted in the same area. *Subject Headings:* **1. Upper air studies 2. Electromagnetic wave propagation 3. Sferics.**—*Author's abstract.*

6D–299 551.510.535:551.508.96

Bergman, C. W.; Macmillan, R. S. and Pickering, W. H. (*Calif. Inst. of Technology*), **A new echnique for investigating the ionosphere at low and very low radio frequencies.** (In: Boyd, R. L. F.; Seaton, M. J. and Massey, H. S. W., eds., **Rocket exploration of the upper atmosphere.** London, Pergamon, **1954.** p. 247–255. 9 figs., 2 refs.) **DWB**—A continuous wave phase measuring echnique for ionospheric observations at low and very low frequency is described. The essential eatures of the system are: (1) a horizontal transmitting antenna near the surface of the ground, vhich is resonant at the operating frequency and which transmits no ground wave in the direction f the receiver; and (2) a receiving station located within line-of-sight of the transmitter at which he phase of low frequency sky wave is directly compared with a reference phase transmitted over very high frequency link. *Subject Heading:* **1. Rocket instrumentation.**—*Authors' abstract.*

6D–300 551.510.535:551.557

Gerson, N. C., **Sporadic E movements.** *Journal of Meteorology*, 12(1):74–80, Feb. **1955.** figs., table, 22 refs. **DWB**—Sporadic E drifts at about 110 km over U. S. are analyzed. In 949–52 direction was variable, but mainly from E at an average speed of about 300 km/h. Profiles f winds 0–90°N, heights 20–140 km from a variety of sources show that at all heights winds are nainly from W in winter and from E in summer. On some occasions rather tight vortices were ound. *Subject Headings:* **1. Ionospheric winds 2. United States.**—*C.E.P.B.*

6D–301 551.510.535

Dominici, Piero, **Sulla misura dell'assorbimento ionosferico.** [Measurement of the ionospheric bsorption.] *Annali di Geofisica*, Rome, 5(4):561–568, Oct. **1952.** 2 figs. English summary . 568. **MH-BH**—Methods of ionospheric absorption measurement developed since APPLETON 1925) are briefly reviewed. The basic principles of two groups of such methods (the method of the ontinuous wave and the pulse method) are explained. An installation for absorption measurement o be established near Rome by the Istituto Nazionale di Geofisica is announced. It will consist f a 3-Mhz transmitter and a synchronized receiver placed 10 km from the transmitter. Trans-nission will be disrupted every 10 minutes for the purpose of identifying interference and disturb-nces. *Subject Heading:* **1. Ionospheric absorption measurement.**—*G.T.*

6D–302 551.510.535:621.396

Budden, K. G., **The numerical solution of differential equations governing reflexion of long adio waves from the ionosphere.** *Royal Society of London, Proceedings, ser. A*, 227(1171):516–537. eb. 8, **1955.** 22 refs., 85 eqs. **DWB**—Two methods are described for obtaining numerical solutions f the differential equations which govern the reflexion of long and very long radio waves from the onosphere at vertical or oblique incidence. Both methods have been used with the EDSAC, the utomatic digital computer at the University Mathematical Laboratory, Cambridge, but the paper s not concerned with the details of the EDSAC programming, nor with the large series of results hat has been obtained. In the first method the first-order simultaneous equations, derived from Maxwell's equations and the constitutive relations for the ionosphere, are integrated by a step-by-tep process proceeding downwards. The integrations are started from properly chosen initial olutions. From the resulting field variables at the bottom of the ionosphere a reflexion coefficient natrix R is derived, whose elements include the familiar reflexion coefficients. Two integrations re needed for each derivation of the elements of R. For the second method, it is shown that the ormulae for R for a level below the ionosphere can be applied also within the ionized medium, and efine a more general matrix variable whose elements are the dependent variables in a new set of ifferential equations. These are integrated by a step-by-step process as in the first method. The olution obtained below the ionosphere gives the required set of reflexion coefficients without further alculation. Only one integration is required for each derivation. The equations are given in full or certain important special cases. *Subject Heading:* **1. Ionospheric reflection.**—*Author's abstract.*

6D–303 551.510.535:550.385

Skinner, N. J. and Wright, R. W., **Some geomagnetic effects in the equatorial F_2-region.** *ournal of Atmospheric and Terrestrial Physics*, 6(4):177–188, April **1955.** 10 figs., table, 12 refs. **DWB**—The difference between the diurnal variations of the maximum ion concentration Nm (pro-ortional to $(f_oF_2)^2$), the semi-thickness of the F2 layer and other parameters at Ibadan (7°26′N, °54′E, magnetic latitude $2\frac{1}{2}$°S) are discussed. The midday minimum of N_m disappears as the days ecome more disturbed, the scatter becomes greater and the total ion content, below the height of naximum ionization, increases. There is a semidiurnal as well as a diurnal component in the hanges introduced on disturbed days. The results are compared with the theory of D. F. MARTYN nd the phase lag is $\pi/2$ instead of π. *Subject Headings:* **1. Ionospheric variations 2. Magnetic isturbances 3. Ibadan, Nigeria.**—*C.E.P.B.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

Akademiia Nauk SSSR, Izvestiia, Seriia Geograficheskaia, Number 1, 1953.

Rikhter, G. D.: **Nekotorye zakonomernosti formirovaniia i rasprostraneniia snezhnykh zanosov i printsipy organizatsii bor'by s nimi,** [Laws of formation and expansion of snow drifts and principles of their prevention], p. 15–22.

Lisitsyn, A. P. and G. B. Ugintsev, G. B.: **O drevnikh beregovykh liniiakh na dne moria,** [Ancient coastal lines on the sea bottom], p. 32–48.

Number 2, 1953.

Vendrov, S. L.: **Izmeneniia v vesennem i mezhennem stoke krupnykh ravninnykh rek evropeĭskoi chasti SSSR v sviazi s preobrasovaniem prirodnykh usloviĭ na ikh vodosbornoi ploshchadi,** [Changes in spring and average runoff of large lowland rivers of the European part of the U.S.S.R., as related to the transformation of natural conditions in their water basins], p. 7–18.

Kurganskaia, V. M.: **Kharakteristika zasushlivykh periodov s tochki zreniia obshcheĭ tsirkuliatsii atmosfery,** [Characteristics of dry periods from the point of view of the general circulation of the atmosphere], p. 19–28.

Number 3, May/June 1953.

Gal'tsov, A. P.: **O klimaticheskom vzaimodeĭstvii oroshaemykh i neoroshaemykh ploshchadeĭ,** [Climatic interaction of irrigated and non-irrigated areas], p. 11–20.

Zaichikov, V. T.: **Klimatologiia v Kitaĭskoĭ Narodnoĭ Respublike,** [Climatology in the Chinese People's Republic], p. 37–40.

Number 4, July/August 1953.

Budyko, M. I. and Drozdov, O. A.: **Zakonomernost' vlagooborota v atmosfere,** [Law of moisture exchange in the atmosphere], p. 5–14.

Gerasimov, I. P.: **Geograficheskie nabliudeniia v Severnoĭ i Zapadnoĭ Afrike,** [Geographical observations in Northern and Western Africa], p. 39–51.

Number 5, September/October 1953.

Akademiku Vladimiru Afanas'evichu Obruchevu, [To Academician Vladimir Afanas'evich Obruchev], p. 3–4.

Berg, L. S.: **O problematichnom usykhanii stepeĭ i pustyn',** [On the supposed desiccation of steppes and deserts], p. 5–13.

Gerasimov, I. P.: **Geograficheskie nabliudeniia v Severnoi i Zapandoi Afrike. II,** [Geographical observations in Northern and Western Africa], p. 54–63.

Number 6, November/December 1953.

Gerasimov, I. P.: **Geograficheskie nabliudeniia v Severnoĭ i Zapandnoĭ Afrike,** [Geographical observations in Northern and Western Africa], p. 31–42.

American Geophysical Union, Transactions, Volume 36, Number 1, February 1955.

Crozier, W. D. and Seely, Ben K.: **Concentration distributions in aerosol plumes three to twenty-two miles from a point source,** p. 42–52.

Mendelbaum, Hugo: **Wind-generated ocean currents at Amrum Bank Light Ship,** p. 72–86.

Cushman, R. L. and Halpenny, L. C.: **Effect of western drought on the water resources of Safford Valley, Arizona,** p. 87–94.
Hosler, Charles L. and Hosler, C. Robert: **An investigation of the freezing of water in capillaries,** p. 126–132.
Works, R. A. and others: **Report of the Committee on Snow, 1953–1954,** p. 149–152.

American Meteorological Society, Bulletin, Volume 36, Number 1, January 1955.

Lenhard, Robert W., Jr.: **An indirect method for estimating the weight of glaze on wires,** p. 1–5.
Buell, C. Eugene: **An evaluation of the results of cloud seeding in Western New Mexico and Southeastern Arizona during July and August, 1951 and 1952,** p. 6–15.
Sion, Elio: **Time constants of radiosonde thermistors,** p. 16–21.
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News and Notes:

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Hilst, Glenn R. and Moses, Harry: **The Argonne Experimental Meteorology Stack,** p. 31–32.
Robinson, N.: **An occulting device for shading the pyrheliometer from the direct radiation of the sun,** p. 32–34.
Cash, Homer F. and Hobbs, T. W. K.: **A well-developed contrail formation,** p. 34–35.
Gifford, Frank, Jr.: **The height of scintillation-producing disturbances,** p. 35–36.
Enger, Isadore: **Month-to-month persistence,** p. 36–37.
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Reviews:

Landsberg, H. E.: **Morley K. Thomas—Climatological atlas of Canada,** p. 39.
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McDonald, James E.: **John C. Johnson—Physical meteorology,** p. 40–41.
Bemis, Alan C.: **E. G. Bowen—A textbook of radar,** p. 41–42.

Angewandte Meteorologie, Berlin, Volume 2, Number 4, January 1955.

Fuss, F.: **Untersuchungen zur Frage des Windschutzes in gärtnerischen Kulturen. (Fortsetzung),** [Investigations of wind breaks in garden cultures. (Continuation)], p. 97–110.
Spangenberg, W. W.: **Zur Klimatisation der Atemluft. Eine bioklimatische Betrachtung,** [On the climatisation of breathed air. A bioclimatic consideration], p. 110–118.
Spangenberg, W. W.: **Die Brauchbarkeit von Messungen der Körpertemperatur für bioklimatische Untersuchungen,** [The usefulness of measurements of body temperature for bioclimatic investigations], p. 119–122.
Wagner, H. and Dinger, H.-J.: **Die Besonnung im oberen Vogtland und ihre Bedeutung für das Pflanzenwachstum,** [Insolation in the upper Vogtland and its importance for plant growth], p. 122–125.

Annales de Géophysique, Paris, Volume 10, Number 4, October/December 1954.

Malan, D. J.: **Les décharges orageuses intermittentes et continues de la colonne de charge négative,** [Intermittent and continuous thunderstorm discharges of the negatively charged column], p. 271–281.
Roquet, J.: **Sur les rémanences magnétiques des oxydes de fer et leur intérêt en géomagnétisme,** [Residual magnetism of ferrous oxides and its importance in geomagnetism], p. 282–325.
Pettit, Helen B.; Roach, F. E.; St. Amand, P. and Williams, D. R.: **A comprehensive study of atomic emissions in the nightglow,** p. 326–347.
Bonnet, G.: **Une particularité de la couche F2 à Lwiro,** [A peculiarity of the F-2 layer at Lwiro], p. 348–350.
Joset, Alain and Holtzscherer, Jean-Jacques: **Détermination des épaisseurs de l'Inlandsis du Groenland,** [Sounding the thickness of the Greenland Ice Cap], p. 351–381.

Arkiv för Geofysik, Stockholm, Volume 2, Number 10, 1954.

Müller-Hillebrand, D.: **The ion capture on polarised drops,** p. 197–225.

Volume 2, Number 11, 1954.

Müller-Hillebrand, D.: **Limitations of the Wilson thunderstorm theory,** p. 227–244.

Volume 2, Number 12, 1954.

Lönnqvist, O.: **Synthetic formulae for estimating effective radiation to a cloudless sky and their usefulness in comparing various estimation procedures,** p. 245–294.

Astronautica Acta, Vienna, Volume 1, Number 1, 1955.

Sänger-Bredt, Irene: **Die Erforschung der Initialvorgänge bei Verbrennungsprozessen,** [Research on the initial stages of combustion processes], p. 3–31.
Strughold, H.: **Space equivalent conditions within the earth's atmosphere. Physiological aspects,** p. 32–40.
Lawden, D. F.: **Optimal programming of rocket thrust direction,** p. 41–56.
Eugster, J.: **Über den Nachweis von schweren Primären der kosmischen Strahlung mittels einer Farbstoffmethode,** [On the detection of heavy primaries of cosmic radiation by means of a dye method], p. 57–60.

Astrophysical Journal, Chicago, Vol. 121, Number 1, January 1955.

Pawsey, J. L.: **A catalogue of reliably known discrete sources of cosmic radio waves,** p. 1–5.
Lundquist, Charles A. and Horak, Henry G.: **The transfer of radiation by an emitting atmosphere. Part IV,** p. 175–182.
Lundquist, Charles A.: **The transfer of radiation by an emitting atmosphere. Part V,** p. 183–189.
Frenkiel, F. N. and Schwarzschild, M.: **Additional data for turbulence spectrum of solar photosphere at long wave lengths,** p. 216–223.
Rothschild, Kurt; Pecker, Jean-Claude and Roberts, Walter Orr: **The prominence of July 25, 1951,** p. 224–230.
Athay, R. G. and Roberts, W. O.: **Coronal line intensities at the Khartoum eclipse,** p. 231–240.
Whipple, Fred L.: **The physical theory of meteors, VII, On meteor luminosity and ionization,** p. 241–249.
Chamberlain, Joseph W.: **The ultraviolet airglow spectrum,** p. 277–286.

Australian Journal of Physics, Melbourne, Volume 7, Number 4, December 1954.

Giovanelli, R. G. and Jeffries, J. T.: **The albedo for the atomic scattering of optical radiation,** p. 570–573.
Jeffries, J. T. and Giovanelli, R. G.: **The emission of radiation from model hydrogen chromospheres. II,** p. 574–585.
Bird, J. R. and Hines, K. C.: **The multiple scattering of protons in nuclear emulsions,** p. 586–600.
Mather, K. B.: **Measurements of the cosmic ray neutron rate in the Himalayas and Australian Alps,** p. 601–614.
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Short Communications:
Ball, F. K.: **Sea surface temperature,** p. 649–652.
Thornton, B. S.: **Microinterferometric examination of nuclear emulsion plates,** p. 652–653.

Ciel et Terre, Uccle, Belgium, Volume 71, Number 1/2, January/February 1955.

Vandenplas, A.: **Note sur l'origine et la définition du mot "climat,"** [Note on the origin and definition of the word "climate"], p. 7–9.
Poncelet, L.: **A propos d'un parhélie exceptionnel,** [An exceptional parhelion], p. 9–14.
Sneyers, R.: **Les corrections barométriques dans la nouvelle convention internationale,** [Barometric corrections according to the new international agreement], p. 15–25.
Bonnet, G.: **Sur l'observation de la nébulosité de nuit à Lwiro,** [Observation of nocturnal cloudiness at Lwiro], p. 26–29.
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Nicolet, M.: **F. W. Paul Goetz (1891–1954)—Obituary,** p. 35–36.
Activité solaire (résumés), [Summaries of solar activity], p. 47.
Sneyers, R.: **Le temps en novembre e décembre 1954,** [Weather in November and December 1954], p. 48–49.

Eire. Meteorological Service, Technical Notes. [Note: No. 1-4, 6-7 republished as their **Geophysical Notes,** v. 3, no. 1-4, 6-7. References in brackets are to MAB.]

No. 1, Doporto, Mariano: **The computation of atmospheric pressure at the 8 km level of constant air density.** 1943.
No. 2, Doporto, Mariano: **Dynamical aspects of the constancy of air density at 8 km.** 1943. [3.11-9]
No. 3, Lamb, H. H.: **Smoke sources and visibility forecasting in Great Britain and Ireland.** 1944.
No. 4, Lamb, H. H.: **The development of a method of estimating and forecasting wind at 10,000 feet over the North Atlantic.** 1943. [3.4-78]
No. 5, Bourke, P. M. A.: **Ice accretion on aircraft.** 1944. [I-89]
No. 6, Doporto, Mariano: **Cell motion in the atmosphere.** 1944. [4.2-94]
No. 7, Doporto, Mariano: **Theory and description of a gradient wind computer.** 1945.
No. 8, Doporto, Mariano: **Construction of isobaric charts for the isopycnic level.** 1948.
No. 9, Granville, M. G.: **Meteorological conditions favourable for the occurrence of poo visibility and of low cloud at Shannon Airport.** 1948.
No. 10, Tierney, S. L.: **Note on the occurrence of non-frontal fog or mist at Dublin Airport during the period October to February.** 1949.
No. 11, Rohan, P. K.: **The utilisation of aircraft weather reports at the meteorological office, Shannon Airport.** 1952. [5.10-39]
No. 12, Bourke, P. M. A.: **Potato blight and the weather: Fresh approach.** 1953. [5.5-155]
No. 13, Bourke, P. M. A.: **The potato blight weather warning service in Ireland in 1952.** 1953. [5.5-70]
No. 14, Guerrini, V. H.: **Evaporation and transpiration in the Irish climate.** 1953. [5.6-194]
No. 15, Bourke, P. M. A.: **Potato blight and the weather in Ireland in 1953.** 1953.
No. 16, Doporto, Mariano: **On the objective determination of minimum density and frequency of upper air observations to meet stated requirements.** 1954.
No. 17, Gillman, C. J. and Rohan, P. K.: **An analysis of wind components at the 700 and 500 mb levels along the great circle track between Shannon Airport, Ireland and Gander Airport, Newfoundland.** 1954.
No. 18, Daly, C. H. and Rohan, P. K.: **An analysis of occasions of poor visibility and low ceiling at Shannon Airport.** 1955.

Geofisica e Meteorologia, Genoa, Volume 2, Number 5/6, September/December 1954.

Petracchi, Gernando: **Le correnti telluriche,** [Earth currents], p. 77-79.
Bossolasco, Mario and Masotto, Antonio: **La costituzione dell'alta atmosfera e la Stazione ionosferica dell'Istituto Geofisico di Genova,** [The constitution of the upper atmosphere and the ionospheric stations of the Geophysical Institute of Genoa], p. 80-86.
Bossolasco, Mario: **La durata dei lampi,** [The duration of lightning], p. 87-88.
Bossolasco, Mario and Meda, Fernando: **La registrazione elettrica integrale degli elementi meteorologici,** [Integral electric recording of meteorological elements], p. 89-92.
Mennella, Cristofaro: **Correlazioni pluviometriche stagionali nell'Italia peninsulare,** [Seasonal rainfall correlations in the Italian peninsula], p. 93-97.
La X Assemblea dell'Unione Geodetica e Geofisica Internazionale, Roma, 14-25 Settembre 1954, [Tenth Assembly of the International Union of Geodesy and Geophysics, Rome, September 14-15, 1954], p. 98-99.
Convegno Internazionale di Meteorologia Sperimentale, Zurigo, 4-6 Ottobre 1954, [International Congress of Experimental Meteorology, Zurich, October 4-6, 1954], p. 100.
Convegno sull'Influenza dei fenomeni atmosferici e cosmici nei processi chimico-fisici, biochimici e biologici, Francoforte s. Meno, 15-16 Ottobre 1954, [Congress on the influence of Atmospheric and Cosmic Phenomena on Physical-Chemical, Biochemical and Biological Processes, Frankfurt a.M., October 1954], p. 100-101.

Indian Journal of Meteorology and Geophysics, Dehli, Volume 5, Number 3, July 1954.

Saha, K. R.: **Atmospheric turbulence and diffusion. Pt. I,** p. 205-218.
Rai Sircar, N. C. and Hariharan, P. S.: **The density of reporting network necessary for proper appraisal of the occurrence of rainfall in small areas in different localities in India in various seasons,** p. 219-229.
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Shorter Contributions:

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Upadhyaya, V. C.: **Dust and thunderstorm on 23 March 1954 at Ahmedabad,** p. 295.

Japan. Central Meteorological Observatory, Tokyo, Weather Service Bulletin, Volume 21 Number 8, August 1954.

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Hirose, Mototaka and Sugiuna, Yoshio: **Report on investigations of the Bibini Island region (Pts. I and II),** p. 234–236.

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Volume 21, Number 9, September 1954.

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Horiuchi, Kōzō: **History of typhoon warning in Japan (Pt. I),** p. 269–271.

Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan, Volume 8, Number 1, March 1954. Special number on Symposium on Ionospheric storms, May 13, 1953.

Uyeda, Hiroyuki: **Ionospheric storms in middle and low latitudes,** p. 3–10.

Martyn, D. F.: **The morphology of ionospheric disturbances in the F2 region,** p. 11–15.

Fukushima, Naoshi: **Seasonal variation of ionospheric disturbance,** p. 17–18.

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Sinno, Kenzi: **On the characteristics of F2 layer variations associated with geomagnetic storms,** p. 28–31.
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Miya, Kenichi: **Characteristics of ionospheric disturbance during a severe magnetic storm,** p. 35–38.
Nagata, Takesi: **Ionospheric storms in high latitudes,** p. 39–44.

Abstracts of recent Japanese publications:

Miya, K.: **Research on high frequency wave propagation characteristics for radio circuit design,** p. 45.
Kato, Y.; Ossaka, J. and Okuda, M.: **Investigation on the magnetic disturbance by the induction-magnetograph, Part I. On the bay disturbance,** p. 46.
Hatanaka, T. and Moriyama, F.: **A note on the long-period variation in the radio-frequency radiation from the quiet sun,** p. 46.

ournal of Agricultural Meteorology, Tokyo, Volume 9, Number 3/4, August 1954.

Nakahara, M.; Tahara, T. and Nakazawa, S.: **Some problems on the farm irrigation (1),** p. 81–84.
Nakahara, M.; Tahara, T. and Nakazawa, S.: **The wheat growth and baido condition (2),** p. 85–87.
Yamazaki, H.; Nishimura, K. and Yamada, T.: **Studies on the influence of the temperature upon the development of the wild silkworm (1),** p. 88–90.
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Kanaseki, S. and Miyagewa, I.: **Micrometeorology in the frame (1),** p. 107–108.
Kanaseki, S.: **Micrometeorology in the frame (2),** p. 109–111.
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Misawa, K. and Misawa, H.: **On some phytometers of seasonal winds,** p. 157–158.

ournal of Atmospheric and Terrestrial Physics, London, Volume 6, Number 2/3, March 1955.

Bibl, K.; Busch, R.; Rawer, K. and Suchy, K.: **La nomenclature ionospherique et les conventions pour le depouillement,** [Ionospheric nomenclature and conventions for evaluation], p. 69–87.
Dungey, J. W.: **Solar electrodynamics,** p. 88–90.
Minnis, C. M.: **Ionospheric behaviour at Khartoum during eclipse of 25th February 1952,** p. 91–112.
Gerson, N. C.: **Sporadic E propagation,** p. 113–116.
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Lewis, R. P. Waldo: **The geomagnetic post-perturbation effect**, p. 129–132.
Greenhow, J. S. and Neufeld, E. L.: **The diffusion of ionized meteor trails in the upper atmosphere**, p. 133–140.
Appleton, Sir Edward and Beynon, W. J. G.: **An ionospheric attenuation equivalence theorem**, p. 141–148.
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Baral, S. S.: **Studies on the sunrise effect in regions E and F**, p. 160–170.
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Journal of Geophysical Research, Washington, D. C., Volume 60, Number 1, March 1955.

Booker, H. G.; Gartlein, C. W. and Nichols, B.: **Interpretations of radio reflections from the aurora**, p. 1–22.
Gunn, Ross: **The systematic electrification of mist and light rain in the lower atmosphere**, p. 23–28.
Heppner, James P.: **Note on the occurrence of world-wide S.S.C.'s during the onset of negative bays at College, Alaska**, p. 29–32.
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Toman, Kurt: **Movement of the F-region**, p. 57–70.
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Donahue, T. M. and Foderaro, A.: **The effect of resonance absorption on the determination of the height of airglow layers**, p. 75–86.
Yerg, Donald G.: **Viscosity in the high atmosphere**, p. 87–94.
Kazni, S. A. A. and Wienert, K. A.: **Magnetic observations during the total sun eclipse of 30th June 1954, at the Magnetic Observatory of Quetta**, p. 95–96.
Wait, James R. and Froese, Charlotte: **Reflection of a transient electromagnetic wave at a conducting surface**, p. 97–103.
Geomagnetic and solar data, p. 105–111.
St. Amand, Pierre and Ashburn, E. V.: **The frequency distribution of the intensity of aurora and the night airglow for 5577 OI**, p. 112–113.
Procopiu, Stefan: **Le moment magnêtique de la terres a commencé â croître**, [The earth's dipole moment started increasing], p. 114.
Ghosh, Mrinmayee: **Geomagnetic control of the *F1* region of the ionosphere**, p. 115–116.

Journal of Meteorology, Boston, Volume 12, Number 1, February 1955.

Reynolds, S. E. and Neill, H. W.: **The distribution and discharge of thunderstorm charge centers**, p. 1–12.
Junge, Christian: **The size distribution and aging of natural aerosols as determined from electrical and optical data on the atmosphere**, p. 13–25.
Riehl, Herbert; Berry, F. A. and Maynard, H.: **Exploration of the jet stream by aircraft during the 1952–1953 winter**, p. 26–35.
Petterssen, Sverre: **A general survey of factors influencing development at sea level**, p. 36–42.
Malkus, Joanne, Starr and Scorer, R. S.: **The erosion of cumulus towers**, p. 43–57.
Petterssen, Sverre; Dunn, Gordon E. and Means, L. L.: **Report of an experiment in forecasting of cyclone development**, p. 58–67.
Birstein, S. J. and Anderson, C. E.: **The mechanism of atmospheric ice formations, I: The chemical composition of nucleating agents**, p. 68–73.
Gerson, N. C.: **Sporadic E-movements**, p. 74–80.
Twomey, S.: **The distribution of sea-salt nuclei in air over land**, p. 81–86.
Pressman, Jerome: **Seasonal and latitudinal temperature changes in the ozonosphere**, p. 87–89.

Correspondence:

Sherman, Leon: **On the computation of horizontal divergence**, p. 90–91.
Blanchard, Duncan C.: **Comments on "On the shape of water drops falling in stagnant air"**, p. 91–92.

Mason, B. J. and Shaw, D.: **The effect of temperature and supersaturation on the growth habit of ice crystals,** p. 93–94.
Arakawa, H.: **Climatic change as revealed by the freezing data of Lake Suwa in central Japan,** p. 94.

arine Observer, London, Volume 25, Number 168, April 1955.

Hay, R. F. M.: **Some landmarks in meteorological progress, Part II,** p. 79.
Parkhurst, P. G.: **Ocean meteorology, Part II,** p. 83.
Skelton, P. N.: **The supply of marine barometers by the meteorological office,** p. 88.
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Book Reviews:
Sailing wind and current, p. 119.
Mathematical practitioners of Tudor and Stuart England, p. 120.
Klimatologie der Nordwesteuropaische Gewasser, [Climatology of the northwestern European waters], p. 121.
The great storm, p. 122.

assachusetts Institute of Technology. Dept. of Meteorology, **Studies of the Atmospheric General Circulation.** Contract AF 19(122)-153, with U. S. Air Force. Cambridge Research Center. Geophysical Research Directorate. **Final Report, Pt. 1, May 31, 1954.** Victor P. Starr, Project Director. [Note: All articles abstracted separately. References in brackets are to MAB.]

I. *The basis for some new studies of the general circulation:*
Starr, Victor P.: **An essay on the general circulation of the earth's atmosphere,** p. 8–12.
Starr, Victor P.: **On the production of kinetic energy in the atmosphere,** p. 13–16.
Starr, Victor P.: **Transport of kinetic energy in the atmosphere,** p. 17.
Starr, Victor P.: **Applications of energy principles to the general circulation,** p. 18–24. [3.5–10]
II. *Observational studies of the general circulation; methods, results and conclusions:*
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Researches on Snow and Ice, Tokyo, (issued by Japanese Society of Snow and Ice), Number 1, October 1953.

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PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Académie des Sciences, Paris, Comptes Rendus.
Acta Geophysica Polonica, [Warsaw].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and Ser. Geofiz., [Moscow].
American Geophysical Union, Transactions, National Research Council, Washington.
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
★**Australian Meteorological Journal,** [Melbourne].
Ciel et Terre, Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
Geophysical Magazine, [Central Meteorological Observatory, Tokyo].
Hemel en Dampkring, [The Hague].
★**Időjárás,** Magyar Meteorólogiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorological Society of Japan, Journal,** Second Series, [Tokyo].
★**La Météorologie,** Société Météorologique de France, [Paris].
Meteorologiia i Gidrologiia, [Moscow].
★**Meteorologische Rundschau,** [Bad-Kissingen].
★**Meteoros,** [Buenos Aires].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Polarforschung, Archiv für Polarforschung, [Kiel, Germany].
Przegląd Meteorologiczny i Hydrologiczny, [Warsaw].
Revista de Geofísica, Instituto Nacional de Geofísica, [Madrid].
★**Revista Meteorologica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Associazione Culturale Aeronautica, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa. Weather Bureau, Notos,** [Pretoria].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

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